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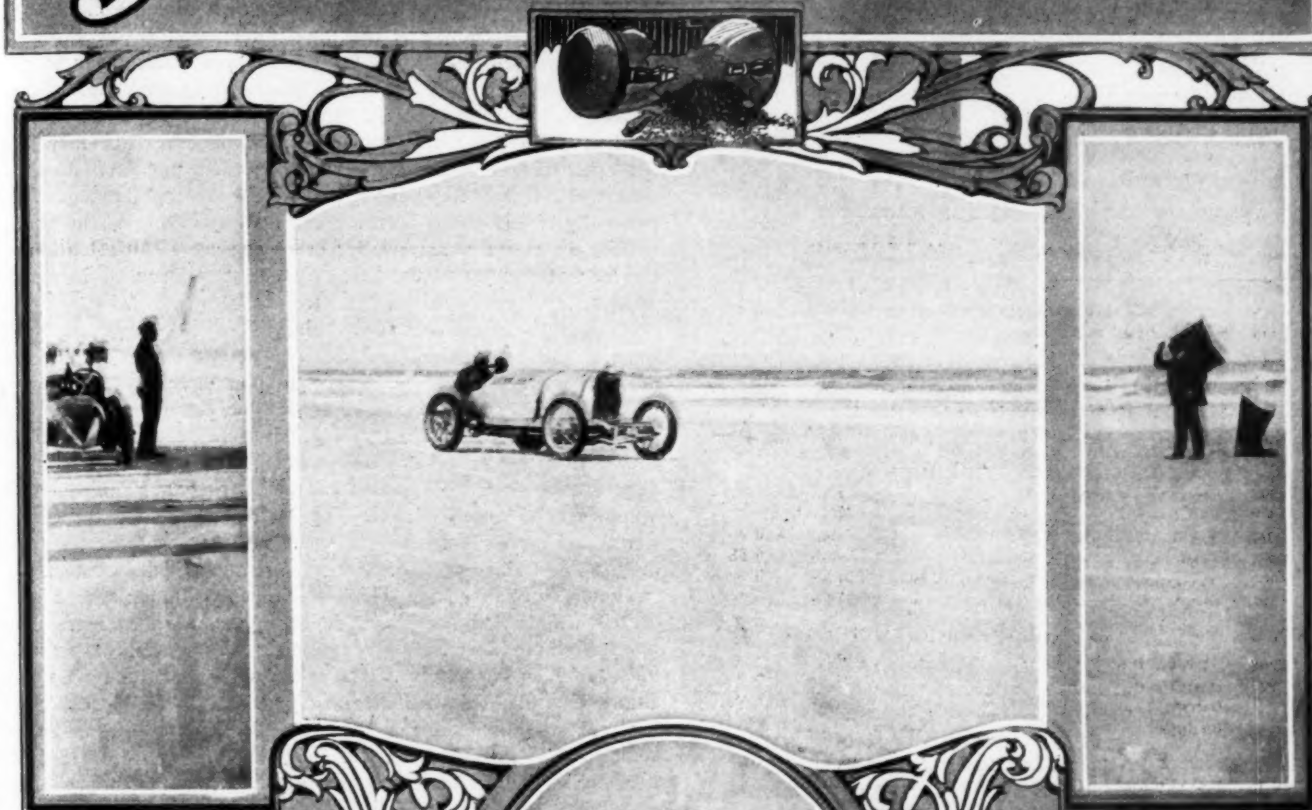
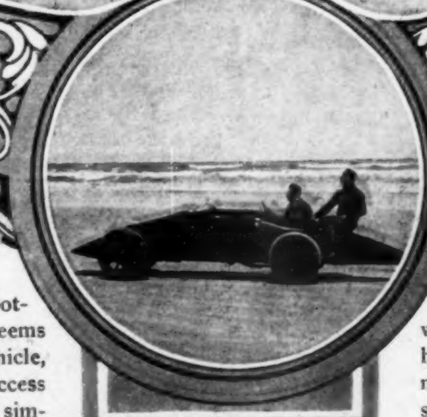
THE AUTOMOBILE





PUTTING a theory into practice is the process which is being employed in the building of automobiles, and the simplicity of the theory, considering surface indications, is at the bottom of many ill-advised attempts. It seems a simple process to apply a motor to a vehicle, and experience seems to indicate that success will attend the effort to whatever extent simplicity serves as the guide. Failure seems to be the product of a series of complex relations, and it is because innovations are too numerous, as a rule, that the results fall far below the usually sanguine expectations.

The best illustration of the good which is derived from the most simple method, will be found in racing automobiles, taking them as a whole. When a contest is to be entered into, the makers of the contesting cars exercise all their ingenuity in the direction of absolute simplicity, and they eliminate every possible construction element in the makeup of their respective products, for no other purpose than to induce stability, engender speed and pare chances down to the lowest possible level.

Were it an easy matter to reduce a theory to practice, racing automobiles would be limited to their performance for the gratification of sports, whereas the sporting phase of the true racing situation is a mere incident. The benefits derived are manifold when a car performs under speed conditions, if the designers watch the performance closely, and take advantage of the knowledge gained.

With the opening of the racing season at Daytona, Florida, on March 23, the attention of the autoing public was again called to this phase of the industry, and those who had occasion to note performances will have observed that new speed records were made, and for the purpose of showing that speed has steadily increased from year to year, tabulations were made and are offered, which will tell at a glance the growth of the automobile industry as it is reflected by increases in the attainable speed of the cars made for that specific purpose.

It is very likely true that the growth of the industry is directly reflected by these very increases in speed, just as the hands on a clock, when they point to the figures of time, offer evidences of the quality of the machinery which controls them. Road performance, under speed conditions, will be good or ill, depending upon the character of the design of the performing automobile, and engineers in attempting to solve commercial problems are enabled to place proper limits upon the design of the component units and parts of the cars they make, with far greater certainty when endurance tests are made.

In the abstract, the diameter of road wheels should be relatively large, so it is said, and in certain classes of vehicles, notably those which travel slowly and bear heavy burdens, the proof seems to be at hand, and the wheels are made relatively

## ROAD RACING

| Year. | Winner. | Miles. | Time. | M.P.H. |
|---|---|---|---|---|
| | **GORDON-BENNETT CUP RACE** | | | |
| 1900. | Charron, Panhard (Fr.) | 351 | 9:09:00 | 38.1 |
| 1901. | Girardot, Panhard (Fr.) | 327 | 8:54:59 | 36.6 |
| 1902. | Edge, Napier (Eng.) | 383 | 11:02:54 | 35.4 |
| 1903. | Jenatzy, Mercedes (Ger.) | 386 | 6:39:00 | 58.4 |
| 1904. | Thery, Brasier (Fr.) | 352 | 5:50:03 | 60.3 |
| 1905. | Thery, Brazier (Fr.) | 340 | 7:02:42 | 47.5 |
| | **VANDERBILT CUP RACE** | | | |
| 1904. | Heath, Panhard (Fr.) | 284.4 | 5:26:45 | 52.2 |
| 1905. | Hemery, Darracq (Fr.) | 283 | 4:38:08 | 61.4 |
| 1906. | Wagner, Darracq (Fr.) | 297.1 | 4:50:10 | 60.8 |
| 1908. | Robertson, Locomobile (Am.) | 258.6 | 4:00:48 | 64.3 |
| 1909. | Grant, Alco (Am.) | 278.1 | 4:25:42 | 62.8 |
| | Harroun, Marmon (Am.) | 189.6 | 3:10:22 | 59.7 |
| | Matson, Chalmers (Am.) | 126.4 | 2:09:52 | 58.5 |
| | **ITALIAN FLORIO CUP RACE** | | | |
| 1905. | Raggio, Itala (It.) | 313 | 4:46:47 | 65.5 |
| 1907. | Minoia, Isotta (It.) | 304 | 4:39:54 | 65.3 |
| 1908. | Nazzaro, Fiat (It.) | 328.2 | 4:25:21 | 74.3 |
| | **FRENCH GRAND PRIX RACE** | | | |
| 1906. | Szisz, Renault (Fr.) (two days) | 774 | 12:14:05 | 63.4 |
| 1907. | Nazzaro, Fiat (It.) | 478.3 | 6:45:33 | 70.6 |
| 1908. | Lautenschlager, Mercedes (Ger.) | 478 | 6:55:44 | 69.5 |
| | **SAVANNAH GRAND PRIZE RACE** | | | |
| 1908. | Wagner, Fiat (It.) | 402 | 6:10:31 | 65.1 |
| | **CIRCUIT DES ARDENNES** | | | |
| 1902. | Jarrott, Panhard (Fr.) | 372.8 | 6:54:00 | 53.9 |
| 1903. | De Crawhez, Panhard (Fr.) | 372.8 | 6:52:50 | 54.2 |
| 1904. | Heath, Panhard (Fr.) | 372.8 | 6:30:49 | 56.8 |
| 1905. | Hemery, Darracq (Fr.) | 372.8 | 5:58:32 | 61.8 |
| 1906. | Duray, De Dietrich (Fr.) | 372.8 | 5:38:39 | 66.2 |
| 1907. | Moore-Brabazon, Minerva (Belg.) | 372.8 | 6:12:11 | 60.1 |
| | **LOWELL, MASS., TROPHIES** | | | |
| 1908. | Strang, Isotta (It.) | 254.2 | 4:42:34 | 54.0 |
| 1909. | Robertson, Simplex (Am.) | 318 | 5:52:01 | 54.2 |
| | Burman, Buick (Am.) | 212 | 3:49:08 | 55.5 |
| | Knipper, Chalmers (Am.) | 127.2 | 2:28:43 | 51.3 |
| | **FAIRMOUNT, PHILADELPHIA, TROPHY** | | | |
| 1908. | Robertson, Locomobile (Am.) | 195 | 4:02:30 | 48.2 |
| 1909. | Robertson, Simplex (Am.) | 200 | 3:38:58 | 55.4 |
| | **CROWN POINT, IND., TROPHIES** | | | |
| 1909. | Chevrolet, Buick (Am.) | 395.6 | 8:01:39 | 49.9 |
| | Matson, Chalmers (Am.) | 232.7 | 4:31:21 | 51.4 |

large. Racing cars, on the other hand, if their performance is to be taken advantage of, would seem to indicate that there is a limit to be placed upon the diameters of road wheels. The centrifugal force, which induces fiber strains in the tires and elsewhere in the rotating mass, is increased enormously, and a limit must be placed thereon accordingly.

Racing conditions developed the weakness of these inferior designs, and the weight of motors decreased from the enormous figure of 50 pounds per horsepower, down to approximately 8 pounds per horsepower in the highly developed racing types of motors, and to substantially 17 pounds per horsepower in the type of motors as used in average pleasure types of automobiles. It has not yet been decided as to whether or not the motors used in every-day work should be much lighter than they are, but engineers are somewhat divided in their opinions, some of whom claim that the lighter the weight of the moving mass, especially if it belongs to the reciprocating members, the better will be the result commercially; other engineers call attention to the lack of rigidity of the parts which are reduced, as in racing practice, and prefer to take a medium course.

Conservatism is an excellent virtue, but this same attribute, were it the sole guide, would have defeated the automobile. Motors would weigh at least 50 pounds per horsepower, in the absence of racing and equivalent experience, and conservatism cries out against racing. It may be too conservative to say that the limit has been reached, from the point of view of available power per pound of metal used, but this question will never be answered excepting by trial under severe conditions, and certainly there is no better way to subject an automobile to an abuse test than to enter it into a speed contest.

The life of a machine which has to serve under kinetic conditions will be long or short, depending upon speed more than upon anything else, and, as experience seems to show, there is no way by which quality can be increased in the same ratio that ability is demanded with increasing speed. If the speed of an automobile is doubled, the stresses which will be set up in the component parts will be quadrupled, and an axle, for illustration, which might be quite satisfactory at 30 miles per hour, would have to work 4 times as hard at 60 miles per hour, and 16 times as hard at 120 miles per hour. Fig. 1 shows the front axle of the 200 horsepower Benz car, and attention is called to the enormous mass of metal which was used. The average

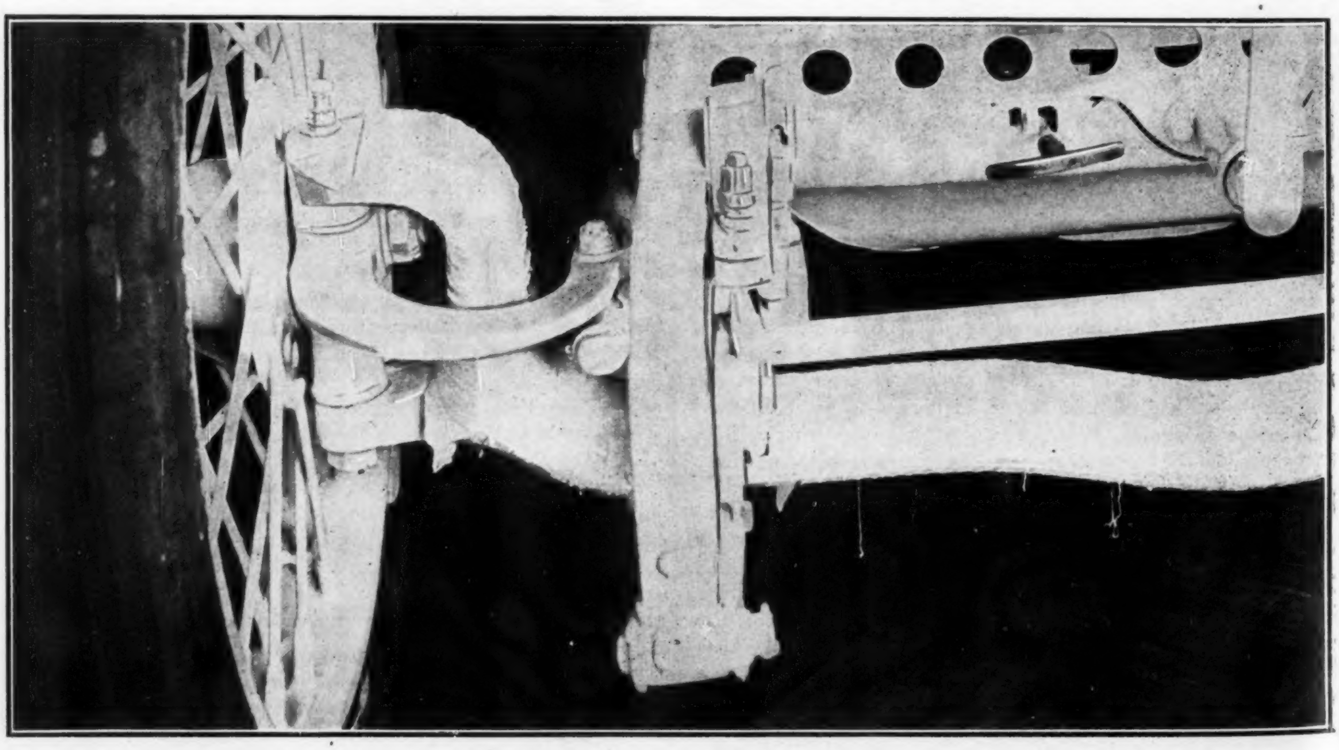


Fig. 1—Front axle construction of the huge Benz racer, which made such a success of racing on the sands at Daytona

automobile enthusiast would naturally expect that the axles and other parts of racing cars should be light, whereas this axle, if it is properly designed, proves to the contrary. That the axle is a nearer approach to correct design than relatively light axles, is proved by the large number of axles which have failed under racing conditions, and some of them were relatively heavy. The simple statement of the law, as above set down, together with the trend in matters of design, goes to show that the reverse to what most people believe is true, and it is in racing work that fallacies are uncovered and facts laid bare. Fig. 2 of the same car shows the rear axle, and attention is called to its perfect symmetry of design, and the secure manner in which it is attached to the side bars, through the springs and the perches.

No form of testing equipment has ever been devised which will determine as to the competence of a motor, under road conditions, from tests made on the "block." There are divers almost insurmountable difficulties attending a block test, which defeat the aim. A motor, to deliver its maximum power, must be tested under conditions which will not harness it down to a series of variable quantities, as when the motor is placed to propel an automobile on the road.

It is the road test which finally settles as to the capability of a motor, and which enables the designer to interject a measure of harmony into the relations. It will not be possible to arrive at the same result by theoretical deduction, nor is the approximation of a theory a reasonable approach to the realization in fact. Motors may be capable of delivering all the power required to drive an automobile at some predetermined and desired speed, but they may not be capable of doing so under the conditions which will govern them under practical working conditions.

Whether or not the new basis for future profit, due to racing, will come this year, it is difficult to predict, but this is no reason why racing should be abandoned, nor will it be proper to justify future activity on the ground that sport demands it. It is not believed that sports will support the automobile industry, and they are one of the effects rather than the pressure on the lever. In the meantime the makers of automobiles will probably continue their effective work, and subject their new models to the strenuous effort which is involved under extreme racing conditions, rather with the hope, perhaps, that something out of the ordinary will come out of it, but with the assurance, in any event, that the weak point will be developed, and a cure effected.

**RIVERHEAD, L. I., TROPHIES**

| Year. | Winner. | Miles. | Time. | M.P.H. |
|---|---|---|---|---|
| 1909. | De Palma, Fiat (It.) | 227.5 | 3:38:36 | 62.4 |
| | Sharp, Sharp Arrow (Am) | 136.5 | 2:09:02 | 63.6 |
| | Chevrolet, Buick (Am.) | 113.7 | 1:37:36 | 69.6 |

**SAN FRANCISCO PORTOLA TROPHIES**

| Year. | Winner. | Miles. | Time. | M.P.H. |
|---|---|---|---|---|
| 1909. | Fleming, Pope-Hartford (Am.) | 254.2 | 3:59:18 | 63.7 |
| | Hanshue, Apperson (Am.) | 211.1 | 3:22:56 | 62.4 |
| | Fleming, Pope-Hartford (Am.) | 148.3 | 2:15:23 | 65.7 |

**LOS ANGELES, CAL., TROPHIES**

| Year. | Winner. | Miles. | Time. | M.P.H. |
|---|---|---|---|---|
| 1909. | Hanshue, Apperson (Am.) | 202 | 3:08:03 | 64.5 |
| | Dingley, Chalmers (Am.) | 202 | 3:38:35 | 55.2 |

**PORTLAND, ORE., TROPHIES**

| Year. | Winner. | Miles. | Time. | M.P.H. |
|---|---|---|---|---|
| 1909. | Dingley, Chalmers (Am.) | 102.2 | 1:44:18 | 58.8 |
| | Arnold, Pope-Hartford (Am.) | 43.8 | 45:53 | 57.2 |

# TRACK AND BEACH RACING

**TWENTY-FOUR HOUR RECORDS**

| | | | | |
|---|---|---|---|---|
| | Brooklands, England, Against Time | | | |
| 1,581.74 miles | 24 hours | Edge, Napier (Eng.) | 65.9 | 1907 |
| | Brighton Beach, N. Y., In Competition | | | |
| 1,196 miles | 24 hours | Mulford and Patschke, Lozier (Am.) | 45.7 | 1909 |

**AMERICAN SPEEDWAY RECORDS**

| | | | | |
|---|---|---|---|---|
| 1 kilo | 0:26.2* | Oldfield, Benz (Ger.) | 84.6 | 1909 |
| 1 mile | 0:37.71 | Strang, Fiat (It.) | 95.4 | 1909 |
| 2 miles | 1:21.51 | Strang, Fiat (It.) | 88.3 | 1909 |
| 5 miles | 4:11.3* | Oldfield, Benz (Ger.) | 71.7 | 1909 |
| 10 miles | 7:01.94 | Strang, Fiat (It.) | 85.5 | 1909 |
| 20 miles | 15:31.80 | Robertson, Fiat (It.) | 77.3 | 1909 |
| 50 miles | 40:14.03 | Robertson, Fiat (It.) | 74.5 | 1909 |
| 100 miles | 1:22:35.35 | Robertson, Fiat (It.) | 72.4 | 1909 |
| 150 miles | 2:05:00.63 | Robertson, Fiat (It.) | 72.0 | 1909 |
| 200 miles | 2:46:48.47 | Chevrolet, Buick (Am.) | 72.2 | 1909 |
| 250 miles | 4:38:57.40 | Burman, Buick (Am.) | 53.7 | 1909 |

*Made at Indianapolis; all others at Atlanta.

**WORLD'S RECORDS MADE ON ORMOND BEACH**

| | | | | |
|---|---|---|---|---|
| 1 kilo | 0:17.04 | Oldfield, Benz (Ger.) | 132.04 | 1910 |
| 1 mile | 0:27.33 | Oldfield, Benz (Ger.) | 131.72 | 1910 |
| 1 mile* | 0:29.57 | Oldfield, Benz (Ger.) | .... | 1910 |
| 1 mile† | 0:40.53 | Oldfield, Benz (Ger.) | .... | 1910 |
| 2 miles | 0:55.87 | Oldfield, Benz (Ger.) | 128.88 | 1910 |
| 5 miles | 2:34 | Hemery, Darracq (Fr.) | 116.8 | 1906 |
| 10 miles | 5:14 2-5 | Brown, Benz (Ger.) | 113.2 | 1909 |
| 50 miles | 38:51 | Fletcher, De Dietrich (Fr.) | 77.2 | 1905 |
| 100 miles | 1:12:56 1-5 | Bernin, Renault (Fr) | 82.3 | 1908 |
| 250 miles | 3:16:48 2-5 | Cedrino, Fiat (It.) | 76.3 | 1908 |

*with passenger. †Standing start.

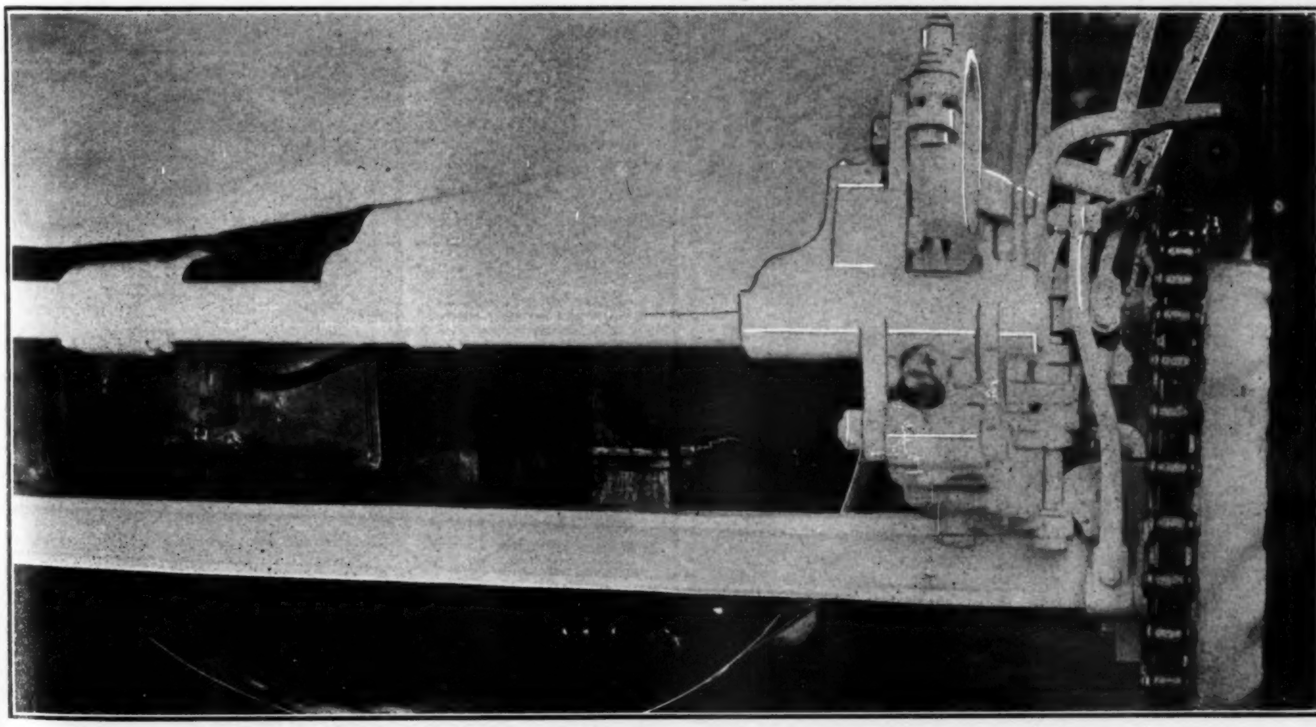


Fig. 2—Rear axle of the same car, showing I-section forging, shock absorber, spring suspension, and chain drive

**Matheson Automobile Company, 1888 Broadway, New York City**

**Factory, Wilkesbarre, Pa.**

Motor, six-cylinder, 4 1-2 by 5 inches; cylinders cast in pairs, with all valves in the head on longitudinal axis, interchangeable.

Cylinders are offset 3-4 inch.

Firing order, 1-4-2-6-3-5.

Pistons are 5 3-4 inches long, 0.010 inch small above first ring, 0.005 inch small below; piston pin 1 1-4 inch diameter, with 5-8-inch hole; connecting rods, 10 inches center to center.

Crankshaft drop-forged of 40-carbon steel, heat-treated, with four nickel-babbitt bearings; crank pins 1 7-8 inch diameter, main journals 2 inches diameter.

Flywheel 18 inches diameter by 5 inches face.

Ignition double; Bosch high-tension magneto and storage battery, with six-unit Connecticut coil, completely independent.

Carbureter, Stromberg. Gasoline tank in rear, pressure feed.

Constant level splash lubrication with gear pump and tell-tale on dash.

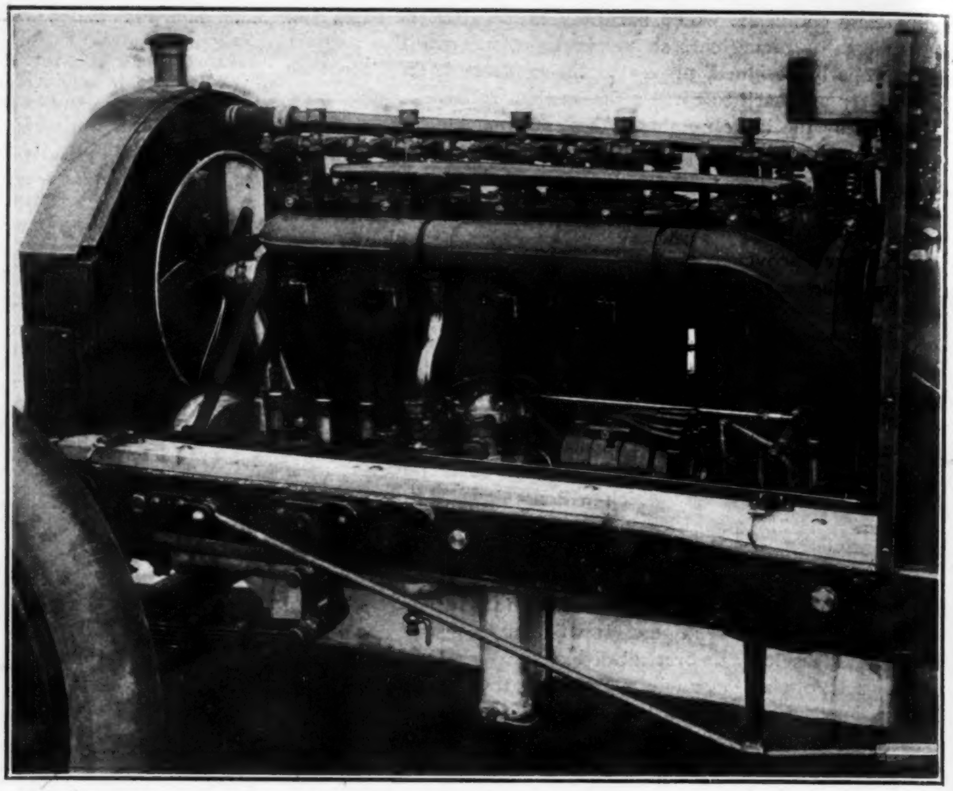
Cooling by honeycomb radiator with 16-inch belt-driven fan and centrifugal pump.

Multiple-disc clutch; 51 steel discs, 10 inches outside, 9 inches inside diameter; 180-pound spring.

Drive by shaft enclosed in torsion tube, with a single joint.

Change-gear on rear axle, selective type, three speeds forward and reverse; gears 6-8 d. p., 7-8-inch face, of nickel steel; Hess-Bright annular bearings.

Rear axle of full-floating type; bevel gears 4 d. p., 1 1-2-inch face, 16 teeth into 44, of nickel steel, oil-tempered; live shafts of hammered vanadium-nickel steel, 1 3-8 inch diameter; Hess-Bright and New Departure bearings; bevel pinion thrust transferred to con-

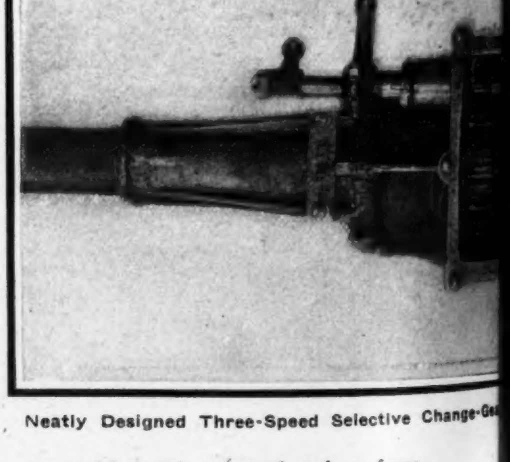


**Exhaust Side of the Matheson Motor, with Water and Oil Pumps, Timer and Magneto.**

# Latest Matheson Six Mechanically Considered

MODEL Eighteen Matheson is the new six-cylinder automobile which is offered by the Matheson Automobile Company, New York City, to 1910 buyers. The touring car is designed to seat five passengers, and the road performance is brought to a high state of perfection, due to the length of the wheel base, which is 125 1-2 inches, and the competence of the tire equipment, which includes 36 by 4-inch tires on the front wheels, and 36 by 4 1-2-inch tires on the rear wheels and other proportions here tabulated. The six-cylinder motor may be described in general as a 4-cycle, water-cooled type, with 4 1-2 by 5-inch bore and stroke of cylinders, respectively, with a company rating of 50 horsepower. The control is effective, and made so by a multiple disc clutch involving the use of 51 discs, and a selective sliding transmission gear, with three speeds forward and reverse, all under suitable control. The weight of the car complete is given as 2,900 pounds, and it is designated by the company as the "Silent Six."

**The Dash Carries the Six-Unit Coil and the Oiler Tell-Tale**



**Neatly Designed Three-Speed Selective Change-Ge**

**Located on**

Conventional lines of design are closely followed in the motor, the six cylinders being cast in pairs; valves are all in the cylinder heads in a row, actuated by push-rods and rockers from a camshaft enclosed in the crankcase. The actuating parts are made very close to size, with only the minimum clearance, so that they are noiseless in operation without being enclosed or fitted with fiber pads. The cylindrical shape of the combustion chamber allows it to be ground internally, thus assuring uniformity of the explosion impulses of the different cylinders. The

stant-mesh pinion bearing by a single 7-8-inch ball seated axially between ends of shafts.

Brake drums 14 inches diameter, 2 3-4 inch face; internal foot brake and external hand brake; bands and shoes faced with Thermoid.

Front axle made by Timken; weldless drop forging, I-section, 2 1-2 by 1 11-16 inch.

Worm and sector steering gear, ball bearing.

Wheels 36 inches diameter, 10 spokes front, 12 spokes rear; tires 36 by 4 front, 36 by 4 1-2 rear.

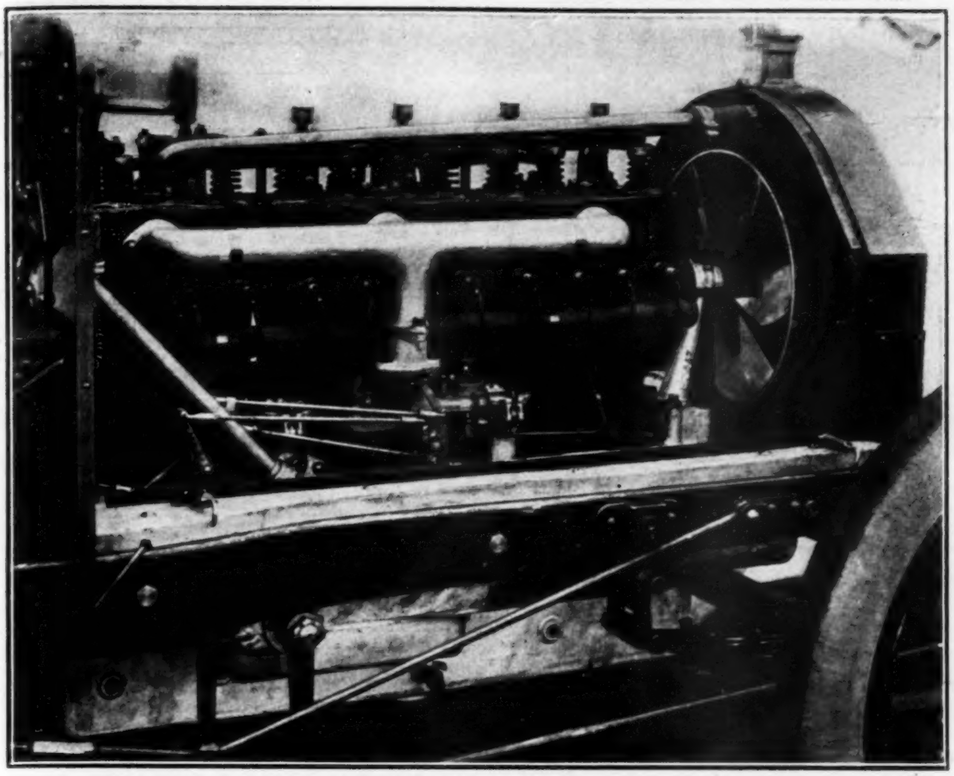
Front springs semi-elliptic, 36 by 2 inches, 7 leaves; rear springs full-elliptic, double scroll, 44 by 2 inches, 6 leaves.

Pressed-steel frame, 30 inches wide in front, 34 inches in rear; channel section 5-32-inch gauge, greatest depth 4 1-2 inches, 2 to 4-inch flange; four cross members.

Wheelbase 125 1-2 inches; weight about 2,900 pounds; price with touring body $3,500, including 5 lamps and gas tank.

Gasoline tank, capacity 25 gallons, is hung from the rear of the frame, with the front side hollowed out to give clearance to the bevel-gear housing, supported by two steel bands, 1-8 by 1 1-2 inch; tank carries 2 pounds pressure, taken from exhaust, with a pressure gauge and hand pump on dash.

Control: Steering by large hand wheel; spark and throttle levers ratchet-retained on the same sector on top of steering wheel, pulling back to open throttle and advance spark; change-gear by inner side lever, working on H-shaped quadrant; emergency brake by outer hand lever, pulled back to apply brakes; left-hand pedal controls clutch and right-hand pedal the service brake; accelerator pedal to right of brake pedal; cut-out button convenient to left heel.

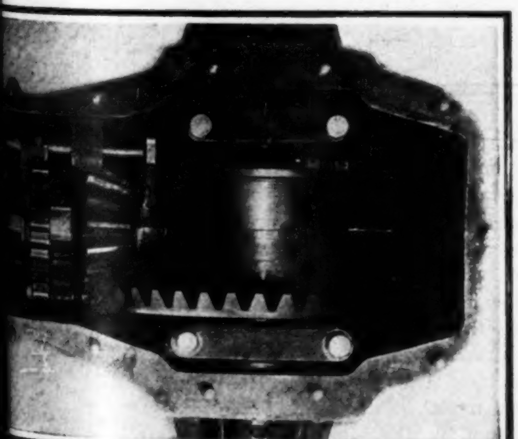


**On the Inlet Side Appear the Carbureter and the Conduit for High-Tension Cables**

valves are 2 3-8 inches in diameter, 2 inches in the clear, seated in sleeves ground to shoulders in the cylinder heads.

The base of the motor is an aluminum casting, flanged out to the side members of the frame in such a manner that no underpan is needed. The lower half is an oil-retainer, and extends back under the flywheel. The crankshaft is carried on four bearings of nickel babbitt; this represents a change from 1909 practice, in which the front bearing was an annular ball type. The photograph shows the completeness of the enclosure. The three-feed mechanical oiler used in 1909 has been replaced by a single gear pump, which maintains a constant level in the crank pits. Oil passes through a tell-tale, allowing the driver to verify the action.

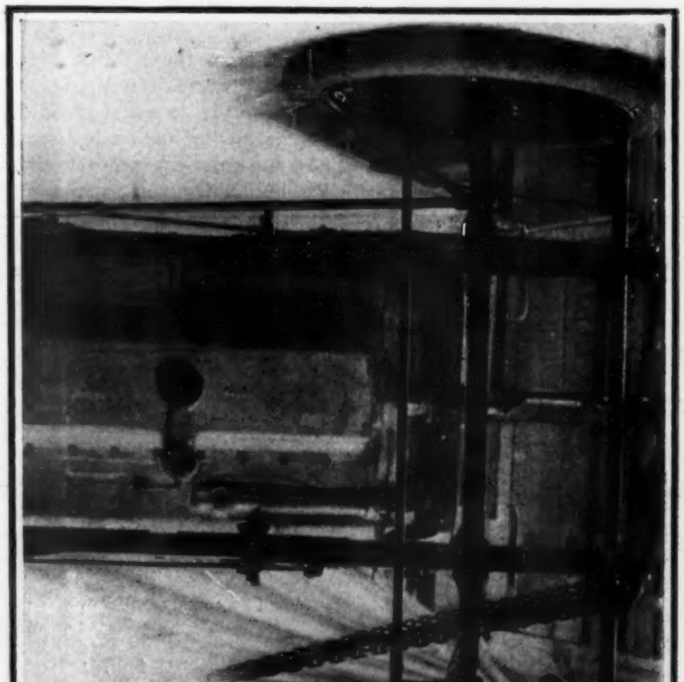
Two independent ignition systems are furnished, including a Bosch magneto, which is located on the left side of the motor, on the pump shaft, and connected by a jaw clutch to allow easy removal. The storage battery auxiliary system works through a six-unit Connecticut coil of a new type in which the units are arranged in two rows of three each, making a very compact box. The systems are entirely separate, each with its own plugs; the high-tension cables are carried through a neat conduit on the right-hand side of the motor.



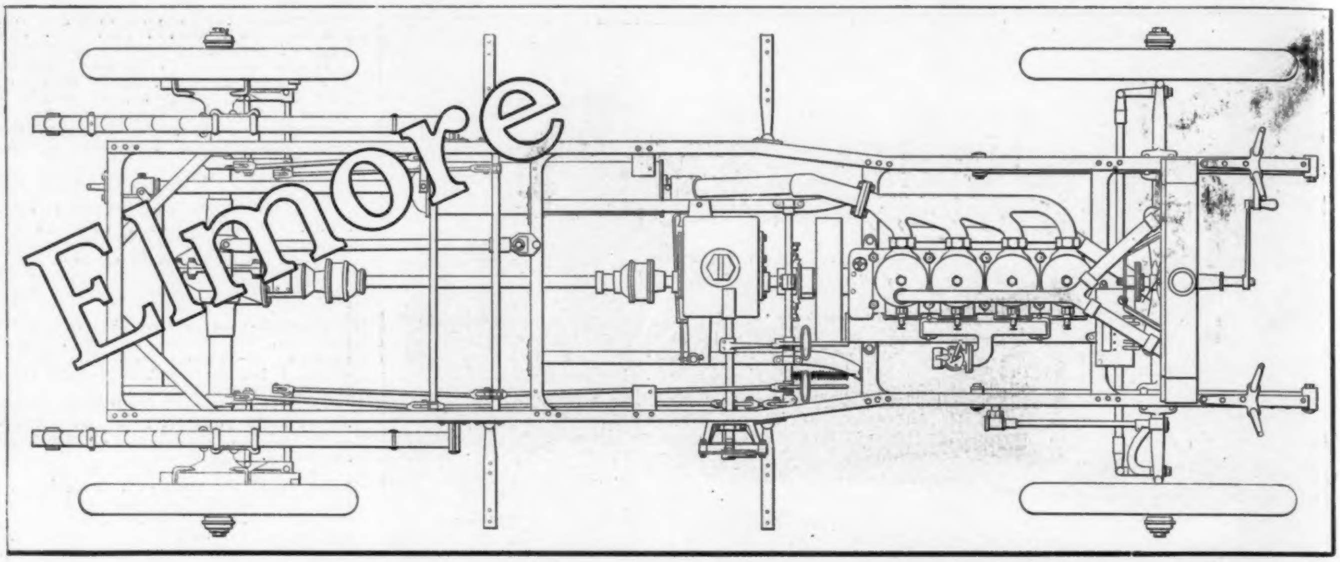
**Change-Ge... Located on the Rear Axle, Mounted on Ball Bearings**

In performance this Model 18 motor leaves little to be desired. It will run idle at 120 r.p.m. with perfect regularity, the speed being so low that it can be verified by timing the valve-lifts with a stop-watch. The muffler cut-out reveals a regular exhaust. The car runs at 3 miles an hour on the high gear without slipping the clutch, still without vibration, and the only sound audible from the front seat is a faint hum from the transmission mechanism.

Matheson Model 18 in general appearance is striking, with a long and distinctively six-cylinder hood. The mud-guards extend into the frame, with a sheet-metal boot between the frame and the running-board. The touring car and the toy tonneau, seating four, both sell at $3,500. For $4,000, this chassis may be had fitted with a new style torpedo body, while at $4,700, a limousine or landaulet type of enclosed body is available.



**Motor Protected Against Dust and Mud Without Separate Pan**




**View from Above of Chassis of Elmore Model 46, Showing Location of Motor, Transmission and Other Parts**

Price, Model 46, touring, $2,500
Weight, equipped, 2,800 pounds
Speed, 4-60 miles per hour
Engine, two cycle, three-port
Bore, 4 1-2 and 6 1-2 in.
Stroke, 4 in.
Horsepower, 46

Transmission, horizontal, selective
Speeds, three forward
Drive, shaft with two universal joints
Wheelbase, 120 in.
Tread, 56 in.
Tires, front, 36 by 4 in.
Tires, rear, 36 by 4 in.

Frame, 27-30 carbon pressed steel
Front Axle, I-section, drop-forged high carbon
Rear Axle, semi-floating
Rear Axle Bearings, double ball type
Wheels, artillery type, second growth hickory
Rims, standard universal

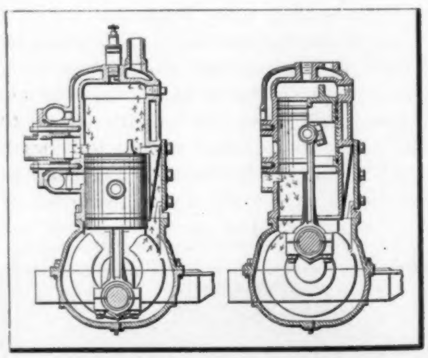
CONSIDERING the latest tendencies in automobile circles, no one is more noticeable, widespread, and popular than the double tendency towards simplification and economy, as usually induced by such simplicity. Bearing this prominently in mind, it is not strange that the public has, of late, shown a decided tendency to give the once despised two-cycle motor a chance.

This is resulting in a number of new designs of this type of motor, and others closely allied with it, to say nothing of new and different types, which are, to say the least, getting a fair chance to "make good." Among these may be noted a revival of interest in fuel injection, as first brought out by Diesel, in the differential piston engine, in the use of rotary crankcase inlet valves, of valves within the piston, in the piston head, to be exact, and in many other forms. Some of these differ widely from both the accepted two-cycle and the usual form of four-cycle engine, while some others, in a desire to excel the older types in fuel economy, have turned to a combination in part of the two forms, utilizing some valves, and valve-operating mechanism, while retaining the inherent simplicity of construction and operation of the two-cycle form.

Nor have the older and well-established makers been content to relinquish their advantage, gained by several years' experience, without attempting something slightly out of the ordinary run. To stand aside and allow newcomers to usurp their chosen field would have been a suicidal policy, because each and every one of the newer inventions might have one single feature which would be of such compelling worth as to give the engine prestige and incidentally business, at a bound, so to speak, regardless of the crudities impossible to avoid in the new and untried product of a maker without previous experience.

**Inlet Side of Elmore High-Duty Engine, Showing Bypass Covers**

Among the tried and proven makers in this field of endeavor, no one is better and more widely known than the Elmore Manufacturing Company, of Clyde, O., founded and maintained by the Becker Brothers, up to the recent acquisition of the plant and good will by the General Motors Company. This latter change, it is said, will not result in any radical change in policy, the idea being rather to continue along chosen lines, and expand rapidly on the proven product. Thus, the factory facilities will be increased to such an extent that the output for 1909 of 800 cars will be "boosted" to 2500 for 1910.



**Sections Through Model 36 Engine**

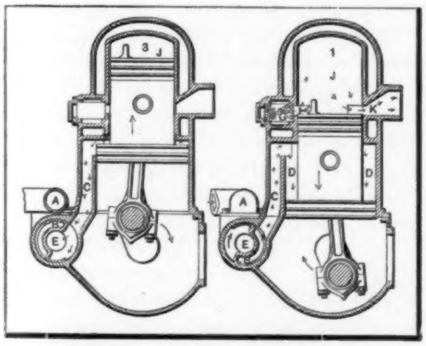
This product has been brought right up to date by a slight change in the design of the engine, without, however, changing the bore and stroke, although there are other changes in the construction of the engine. The old engine is also made and used in the lower-priced model, now called Model 36, while the newer engine is only used in the higher-priced car, which is called Model 46, the two names being indicative of the amount of power developed by the two motors.

Both are of the four-cylinder, two-cycle, three-port type, but on the higher-powered unit, the differential piston is used. For the benefit of those to whom this nomenclature is strange, it might be stated that this consists of a second and larger diameter for the lower part of the piston, which enlarged diameter works in a cylinder bore of similarly enlarged diameter. This latter part of the cylinder bore has a head or top partition

of its own, similar to that of the ordinary piston. This enlarged portion is connected to the inlet pipe, which is set low along the right side of the engine, through the medium of a long compartment or by-pass, the lower end of which is opened and closed at the proper time by means of a rotating valve set within the inlet pipe.

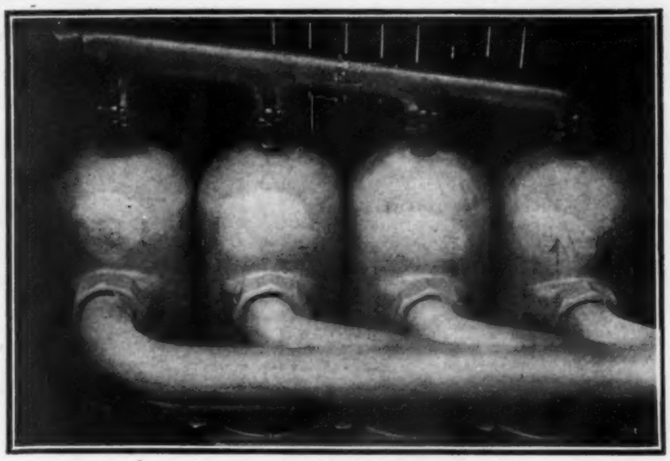
This rotating sleeve, for it is more of a sleeve than a valve, is driven off of the crankshaft by means of reduction gearing. In operation, the annular ring, or differential piston, supplies compressed gas to other cylinders, numbers 3 and 4, for instance, compressing gas which flows through into cylinder one's combustion chamber, while the enlarged pistons of 2 and 1 are drawing in and compressing a fresh charge, the shape of the internal part of the distributor sleeve being such as to allow of this. The firing order is 1, 3, 2, and 4, in order from front to rear. Then, considering the operation just described, the next order, after firing cylinder 1, and exhausting from the same, would be cylinders 1 and 2 compressing fresh gas, which would flow through the distributor into the cylinder next in firing order, namely 3. At the same time, the differential pistons of cylinders 3 and 4 are draining in fresh gas.

Getting down to the specific action in any one cylinder, as illustrated by the adjoining small drawing, which shows a section through two cylinders, set side by side, and which are lettered in order to make the operation clear, the incoming gas is drawn into the annular chamber "D" during the entire downward stroke of the piston. The gas passes from the carbureter through the manifold "A" into the distributor "E", then through the distributor port "B" and pump by-pass "C", entirely filling the annular chamber above referred to (Fig. 1).



Sections of Model 46 Motor

At the same time the gases in chamber "D" (Fig. 3) have been compressed (the crank of this cylinder being on the opposite cycle from Fig. 1), forcing the new gas through by-pass of Fig. 3 into the distributor, which has now changed its position to admit the new gas, and on through port by-pass "F" and ports "H" into the combustion chamber, where, upon being compressed, the gases are ignited and escape through port "K" at the conclusion of the downward stroke of the piston.

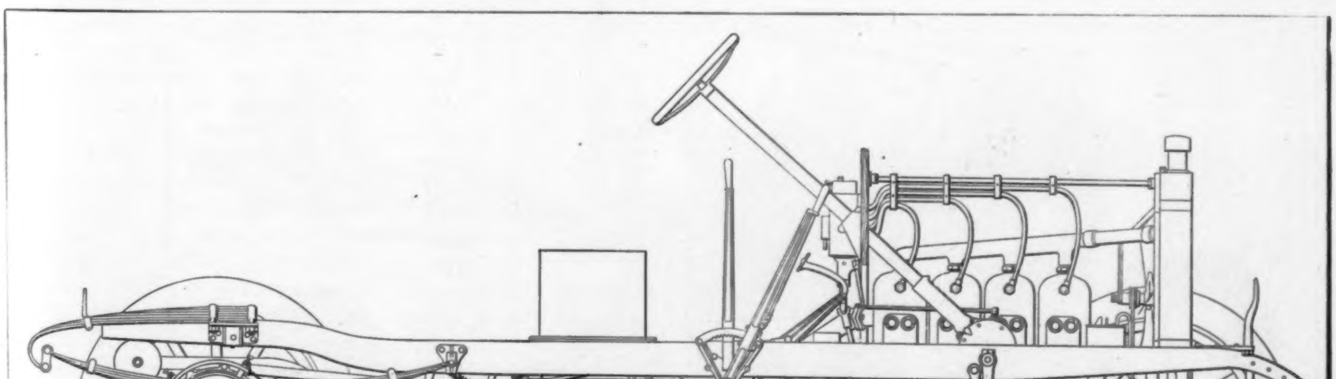


Left Side of High-Duty Motor Showing Exhaust Pipe

There is no intermingling of new and old gas for several reasons. In the first place, there is not time enough; and the escape of the exhaust gas through the port "K" has an ejector effect, creating a tendency to draw in the new gas through a partial vacuum caused by the rapid and complete discharge of the exhaust gas. The incoming gas, through the timing of the inlet port and the shape of the deflector plate on the top of the piston, must first pass to the top of the cylinder, then filling the partial vacuum caused by the exhaust of the exploded gases.

Exhaust in each case is no different from the ordinary case, the port being an opening in the side of the cylinder casting, which, opening the descending piston, uncovers at the proper time. In addition, the deflector on the top of the piston turns the incoming gases upward, away from the outgoing and worthless burned products. In effect, then, the uncertainty of crankcase compression and feeding by guess to the combustion chamber is replaced by exact and determinable compression in a small cylinder for that specific purpose, using a special piston, which compressed product is led accurately into the proper cylinder through a correctly timed rotating valve, mechanically driven. The whole effect should be to make the engine more reliable and efficient in just the proportion that approximations and guesswork are replaced by mechanical certainty.

In Model 36, the older form of engine is retained. This is shown on the page opposite for comparison with the newer type. It has the three ports, the gases being compressed in the crankcase, passing through a by-pass, screened to prevent back-firing.



Side Elevation of Model 46 Chassis, Showing Large Wheels, Springing, and Shape of Frame

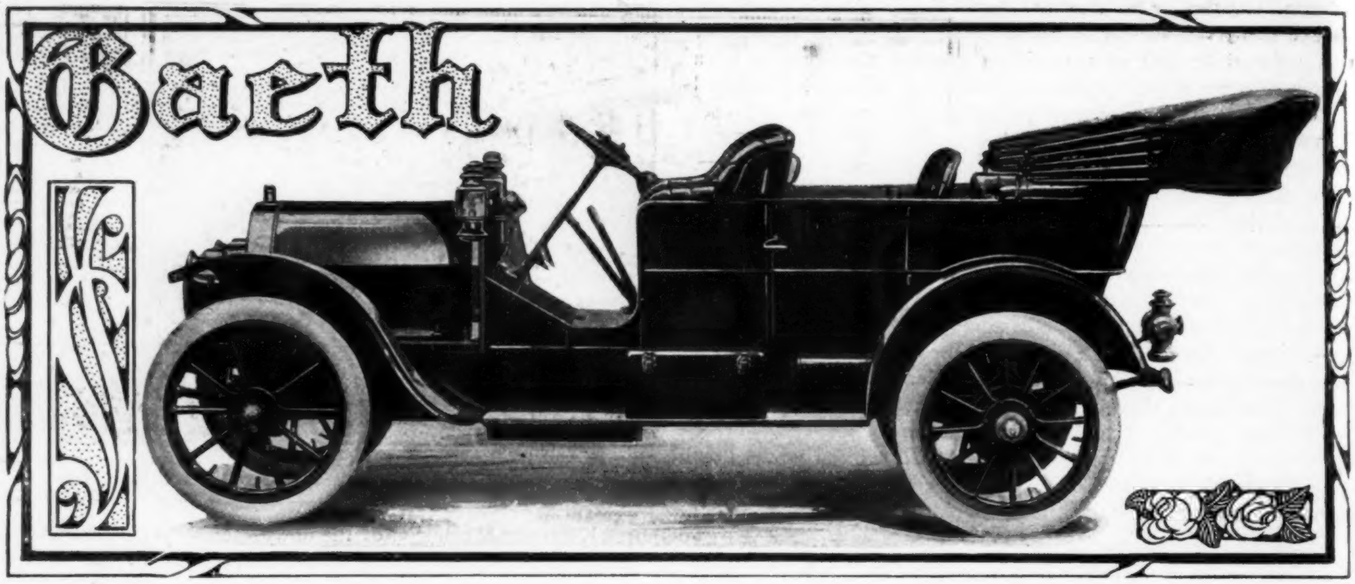



**Fig. 1—Gaeth touring car with an attractively designed body following in general the straight-line type, fully equipped**

MODEL XXI, 1910 Gaeth, represents a chassis which is normally designed for touring service, and with the side entrance body as presented in the title illustration, it represents characteristic Gaeth construction. Before proceeding with the discussion, involving the power plant and mechanical equipment of the above model, it will be in order to state that the Gaeth Automobile Company, of Cleveland, Ohio, manufactures a commercial type of automobile, in addition to the Model XXI chassis, as used for pleasure automobiles.

The motor, which is used in the Model XXI Gaeth chassis, is shown in Figs. 2 and 3. Referring to Fig. 3, the magneto *M1*, which is responsible for the ignition work, is set on a raised surface of the extension of the crankcase (top half) and is driven by a flexibly contrived shaft, which takes its power from the half-time gear system in the housing *H1*. The flange *F1*, with its overhang *H2*, and a similar overhang at the opposite end, butts against the chassis frame, and under pans are not required, because the shape of the crankcase, in view of the flaring extension referred to, renders the system self-contained and tight against foreign matter of any kind whatever.

The ignition system will require a little explanation, in view of a certain ingenuity of construction, involving the make-and-break principle, and in which a vertical shaft *S1*, Fig. 2, raises up at the right side of the motor in a mid position between the two pairs of cylinders. The base of this shaft holds a spiral gear, engaging a similar gear attached to the intake valve camshaft, from which power is derived. A means is afforded for sliding the gear on the vertical shaft in the axlewise direction, for the purpose of adjusting the timing relation. A two-piece bronze sleeve is fastened over the camshaft, and bears in a groove in the end of the sliding gear. The spark level on the steering wheel is connected to this sleeve by suitable links and a motion, for the purpose of enabling the driver to suitably advance or retard the spark.

To the top of the vertical shaft *S1*, Fig. 2, there is a pair of small cranks, which are related to as many push rods in a horizontal position, which are placed there to trip the contact arm of the igniter. The excellence in point of detail of this ignition system will best be appreciated by observing the character of the work indicated as *I1*, Fig. 2, this being one of the vertical post stops.

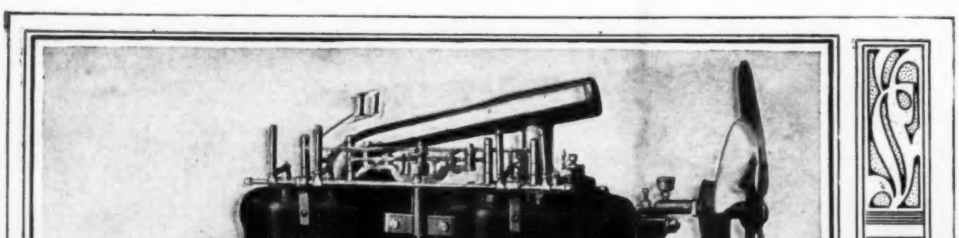



Fig. 3—Make-and-break ignition system actuated by a vertical shaft

The four-cylinder water-jacketed motor of the four-cycle type is of symmetrical design, with the cylinders cast in pairs. The bore is 4 7-8 and the stroke 5 1-4 inches. In the design of the cylinders, particular attention was paid to the water-jacketing, the idea being to allow a sufficient volume of water at every point to assure efficient cooling. The path of the current of water is directed in such a way that each portion of the water is heat-ladened to its maximum ability, and the ills of unequal expansion are avoided. The metal used in the cylinders, pistons and piston rings is a specialized gray iron product, which affords a hard white surface over the cylinder bore, and a close grain in the section with a sufficiently high average strength to indicate competence.

The valves are placed in offset extensions, with the inlet and exhaust on opposite sides T-fashion, and the valve diameters are substantially equal to half the cylinder bore, which

condition, together with a properly arranged compression, well-timed ignition and suitable carburetion, is responsible for the tenacity with which the torque holds under conditions of increasing speed, so that the power of the motor increases in direct proportion to speed, up to a high point in the range of performance.

The camshafts, one for each valve system, placed on opposite sides within the crankcase, are supported by three well-designed white metal journals, and with the half-time gears, are completely enclosed. Means for profuse lubrication are provided, and silent performance, which is experienced, is due to:

(A) Accuracy of workmanship.
(B) Muffling effect of the housing.
(C) Precision of adjustment.

Much of the good performance of the motor may be traced to the shape of the valves, which, by the way, are the same size for inlet and exhaust, lightweight of the reciprocating mass, and the well-designed valve springs which have life and strength sufficient to compel the roller to hug the cam faces, so that the valves close within the minimum allowable angular distance of travel of the camshaft.

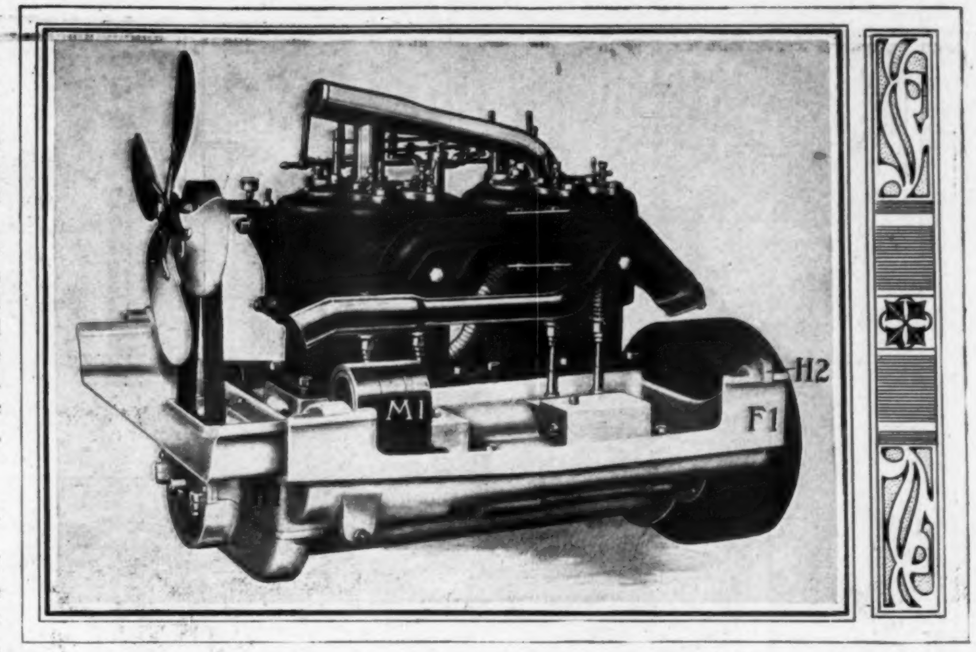



Fig. 3—Large pipes allow natural water circulation, without pump

As a further indication of the competence of design of the motor, the connecting rods and pistons may be examined, when it will be found that the pistons are shaped for strength in the absence of undue weight, and the connecting rods are drop forged from a suitable grade of carbon steel, after which they are annealed, thus inducing kinetic qualities, the idea being to make them not only stout, but light, in order that the secondary moments which increase as the speed square, will be so limited that the extreme fiber strain in the shear plane of the most critical point in the crankshaft will be within the allowable limit, taking as a basis the life of the steel, under conditions of diagonal work, remembering that it is but short, if the extreme fiber strain is any great proportion of the elastic limit of the material used.

Aluminum is used for the top and bottom half of the crankcase, transmission gear case, and such other parts as may be produced for the purpose of maintaining the total weight of the car within proper limits without endangering life, which is a matter of properly utilizing aluminum, it being the lighter of the metals with strength sufficient for the work it is placed to do.

In Fig. 4 are to be seen both of the axles, the front with the steering knuckles, and cross-connecting rod, and the rear with brakes, brake operating levers, truss rod, and other parts. The former is of the I shape, now so general, and has a deep drop in the center. The cross-connection, on the other hand, is carried straight across, being placed back of the axle, so as to be protected at all times. The spring pads, for the support and attachment of the springs, are forged integral with the bed. In the axle end construction, a thrust bearing is placed below the upper arm of the axle, thus taking up all heavy load from above.

The rear axle is composite, being of several parts, each best suited as to shape and material to the work to be done, the whole being united into a complete and sturdy unit, by riveting and welding, the spring pads being held on by means of bolts. The brakes are of two kinds, internal expanding and external contracting. The former are separately operated.

There are many other points of mechanical design which are characteristic of the Gaeth engineering office that accord fully with the methods thus far described, and a close study of the illustrations here given will render them at once apparent.

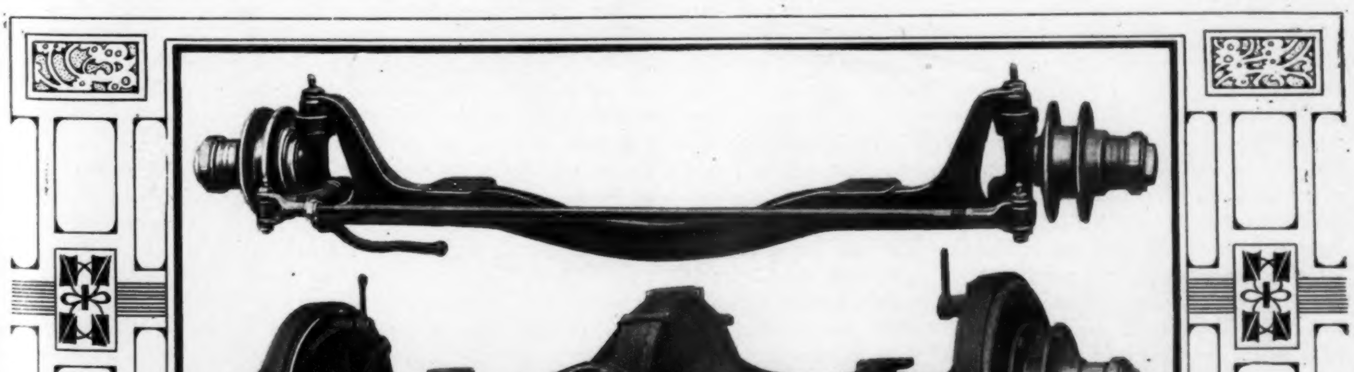


Fig. 4—Front and rear axles, both of standard design; the former an I-section forging, the latter of the floating type.

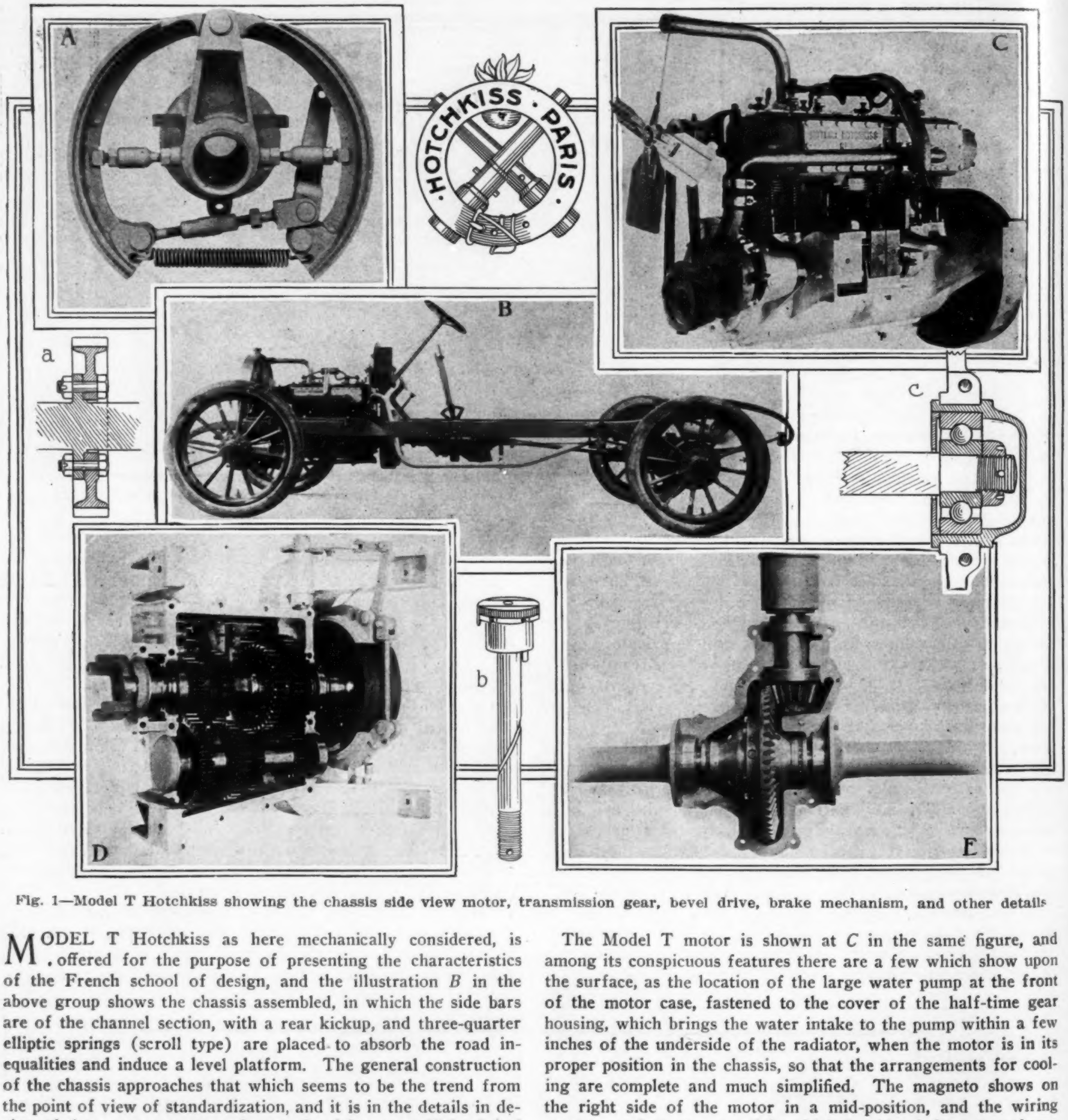



Fig. 1—Model T Hotchkiss showing the chassis side view motor, transmission gear, bevel drive, brake mechanism, and other details

MODEL T Hotchkiss as here mechanically considered, is offered for the purpose of presenting the characteristics of the French school of design, and the illustration *B* in the above group shows the chassis assembled, in which the side bars are of the channel section, with a rear kickup, and three-quarter elliptic springs (scroll type) are placed to absorb the road inequalities and induce a level platform. The general construction of the chassis approaches that which seems to be the trend from the point of view of standardization, and it is in the details in design of the component parts that much of interest will be found if the keen observer looks.

Referring to *A*, which is at the upper left-hand of Fig. 1, the internal expanding brake mechanism shows a stout spring release, which is diametrically the point of hinging of the two shoes, and the spring is prevented from pulling the shoes toward the axis in the radial plane by a pair of adjustable limit stops, which are jacks of the screw type in miniature. Lock nuts are responsible for the permanence of the adjustment of the jacks. When it is desired to apply pressure to the brake drum, motion is imparted to a lever arm, the fulcrum of which is at the terminus of one of the shoes, and a strut, with a turnbuckle to vary its length, engages the arm near the fulcrum, and is connected with the adjacent arm. By means of this adjustable strut, the shoes are expanded, and the distance of travel of the brake arm, for a full engagement of the brakes, may be varied by altering the length of the strut, through the good office of the turnbuckle.

The Model T motor is shown at *C* in the same figure, and among its conspicuous features there are a few which show upon the surface, as the location of the large water pump at the front of the motor case, fastened to the cover of the half-time gear housing, which brings the water intake to the pump within a few inches of the underside of the radiator, when the motor is in its proper position in the chassis, so that the arrangements for cooling are complete and much simplified. The magneto shows on the right side of the motor in a mid-position, and the wiring passes up through a conduit which is shaped for convenience, while the arrangement suggests system and freedom from ignition troubles. The air fan, which is run by a flat belt with a wide-faced flanged pulley at the driving and driven end, has unusually large veins and suggests capability. The cylinders are provided with separable jacket covers, which have three advantages, (a) the castings come from the foundry in a more perfect state, because the gases which are generated during the pouring process are tapped away through the openings thus afforded; (b) the castings may be freed from core sand; (c) in service, if the cooling water is full of sediment, and it forms a crust over the heated surfaces, the covers may be taken off and the crust may be gotten at and removed.

Referring to *E*, the jack shaft, bevel drive and differential gear system are presented, half of the housing being removed for the purpose. The differential gearing is compact, is of the bevel gear system, and the housing is provided with holes, through

which grease may circulate for an obvious purpose. The bevel gear, which meshes with the driving pinion, is flanged to the differential housing, and it is conspicuous for its shape. The design of the bevel gear is symmetrical, with uniform thicknesses of metal at every point, and the noiseless performance obtained in practice is due to absence of deformation of the bevel gear during the heat-treating process to which it is subjected to give to it kinetic properties. The driving pinion fetches up on a taper, and a large castellated nut engaging a threaded portion on the end of the propeller shaft assists in forcing the pinion up on the taper and holds it in place. The shaft terminates with the pinion, and two annular types of ball bearings placed just back of the pinion carry the load. The bearings are relatively large, and are spaced far apart so that the tendency of the propeller shaft to float away from the bevel gear is adequately resisted. The shaft terminates in a universal joint just outside of the housing.

The transmission gear is shown at *D*, and the service brake drum is on an extension of the shaft, just outside of the case, and the method of its application is suggested by the arrangement of the links and levers there indicated. The system is selective, with four speeds and reverse, and the gears have wide faces, and are securely placed on shafts of relatively great diameter, considering the distances between bearings, so that shaft deflections are reduced to the infinitesimal increment.

The sketch (a) shows how the gears are flanged and bolted to the shafts, and it is pointed out that the gears are of symmetrical design, with even thicknesses of walls, hence they may be finished and heat-treated with the minimum difficulty, from the point of view of deformation, so that in service undue strains will not be present and noiseless performance will be more nearly assured. Sketch (b) shows a detail which represents the knuckle pin, which is made of a fine grade of alloy steel, is threaded at the lower end, has an integral bowl-shaped enlargement at the upper end, in which a cavity is fastened for the purpose of storing grease, and a compressor top, with a suitable lock, may be screwed down for the purpose of forcing grease into the bore of the pin, thence out through holes, which register with a groove, the latter being shown. Sketch (c) suggests the secure manner of placing the radial ball-bearings which are used in Hotchkiss cars. The bearings are a sucking fit over the spindle, press up to a shoulder and are held in place by castellated nuts. Separate bronze housings are used in conjunction with these bearings, and means are at hand for retaining the non-acid grease which is recommended for use with ball-bearings.

### SOME INDICATIONS OF EXCELLENT SERVICE

Fig. 2 presents a group of parts which were taken from a Hotchkiss car and put under seal by the technical committee of the R. A. C. After the car, which was rated at 45-horsepower, traveled 10,000 kilometers in France (6,250 miles) it subsequently entered the English Tour, and made 15,000 miles under the observation of the technical committee of the R. A. C. The photographs were taken with the seals of the R. A. C. intact, and a close inspection of them develops nothing by way of noticeable depreciation or even ordinary wear.

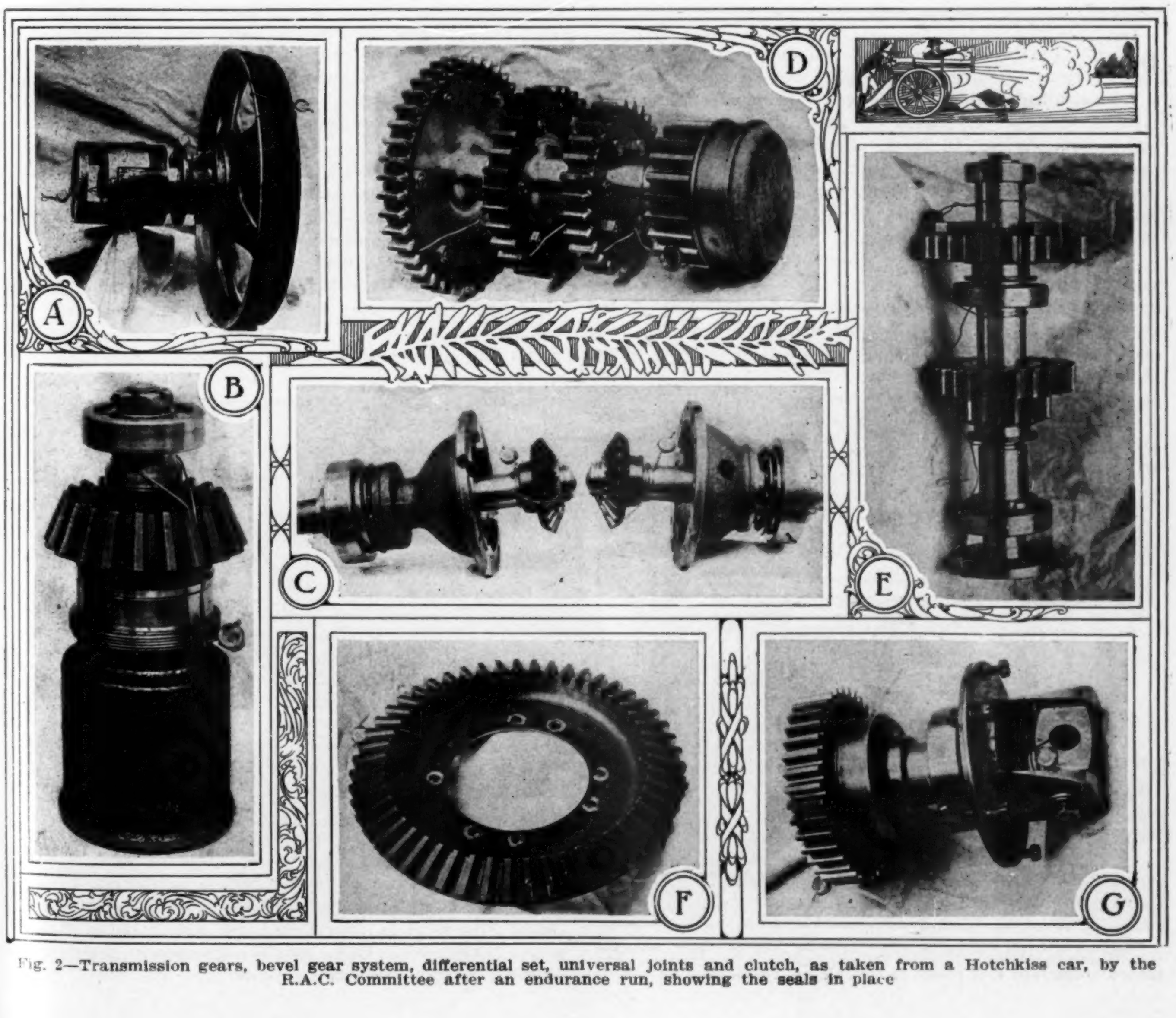



Fig. 2—Transmission gears, bevel gear system, differential set, universal joints and clutch, as taken from a Hotchkiss car, by the R.A.C. Committee after an endurance run, showing the seals in place

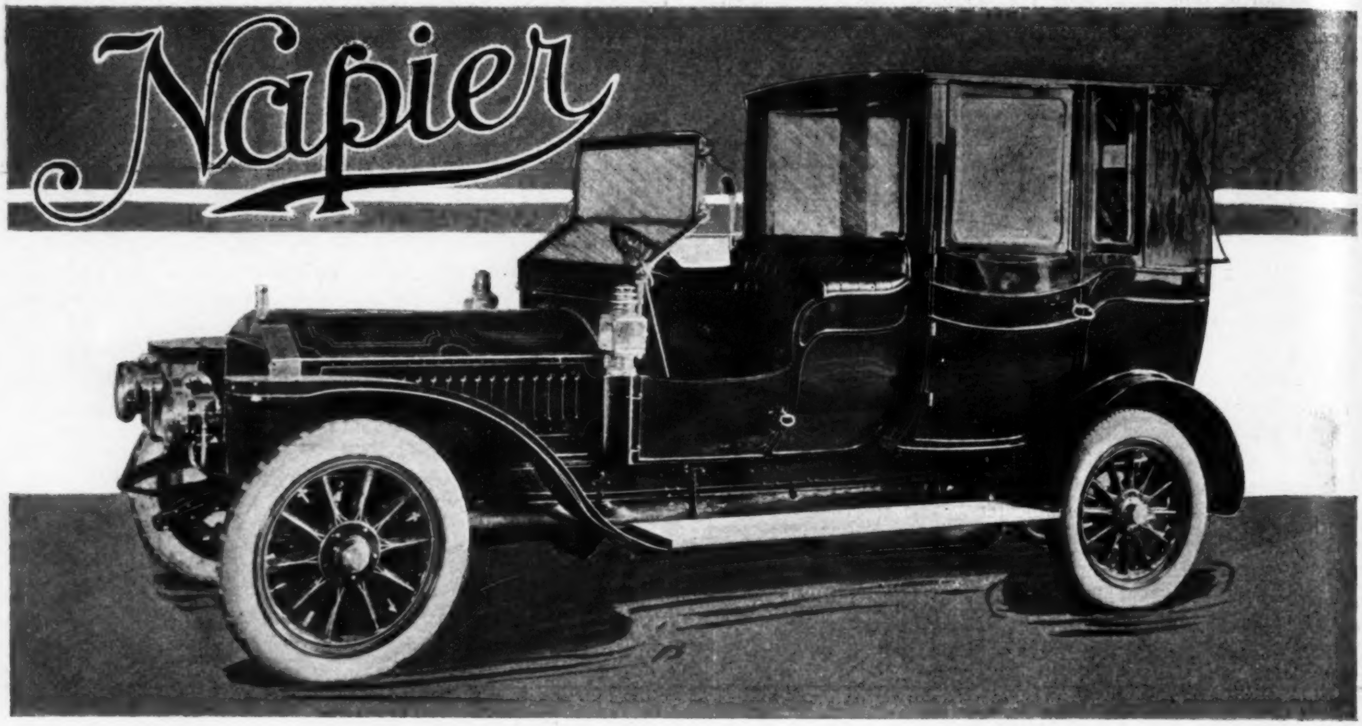



Fig. 1—Six-cylinder Napier landau with long wheelbase, excellence of accommodation, ample power, definite control, and class distinction

GLANCING at the title illustration discloses a Napier six-cylinder automobile, in this particular example, fitted with a landaulet body, which is selected to accentuate the characteristics of Napier cars from the point of view of appearance and accommodation. It will be observed that the wheelbase is sufficiently long, not only to afford room for a six-cylinder motor, but to include a wide side entrance in the body design, and at the same time leave for the driver's accommodation a full-sized seat and ample foot room.

It is distinctly in the path of wisdom to make the wheel base such as to permit of utilizing a motor, if of the six-cylinder type, which will not be cramped in point of design for no better purpose than to save room, and the side entrance of the body must of necessity be wide. It is an excellent idea so to place the door that it will swing open in the forward direction. In this design the door is far enough towards the front of the car to clear the rear mudguards. It is also advantageous to allow the standard proportions for the driver's seat, and the regular amount of foot room, thus permitting him to assume an easy and natural position.

The Napier six-cylinder motors are made as follows:

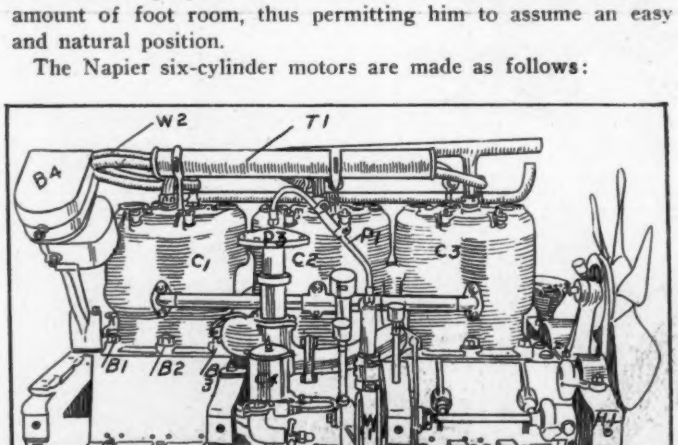



Fig. 2—Sketch of right side of six-cylinder Napier motor, showing the diaphragm connection from the carbureter to the water pump, secure wiring, and four points of fastening to the chassis frame.

(A) Thirty horsepower, shaft drive (R. A. C. rating 25.3 horsepower), which is known as No. 16, with a landau body, which includes a canopy over the driver with a means for carrying it on the runabout opposite the driver's seat on the right side.

(B) Forty horsepower, chain drive, with a special chassis, including a three-speed transmission, pressed steel frame, 11-foot 2-inch wheel base, standard gauge, three-quarter platform near rear, and a wheel equipment which includes 880 by 120 (millimeter measurement) tires on all wheels. The gearcase has ball bearings, and the anti-friction equipment extends throughout, with the exception of the crankshaft, which has plain bearings.

(C) The 45-horsepower motor (R. A. C. rating 38.4 horsepower), unlike the 40, is fitted into a chassis which rolls on wire wheels. The tire equipment on this chassis is 880 by 120 front, and 895 by 135 rear, in millimeters. This model is a shaft drive, has a three-speed transmission and pressed steel frame. The wheelbase is 11 feet 2 inches, with standard gauge.

(D) The 60-horsepower motor (R. A. C. rating 60-horsepower) has a motor with a bore of 4 inches and a stroke of 5 inches, and six cylinders, of course. The wheelbase of this chassis is 11 feet 2 inches, with standard gauge. The tire equipment is 880 by 120 front, and 895 by 135 rear, in millimeters.

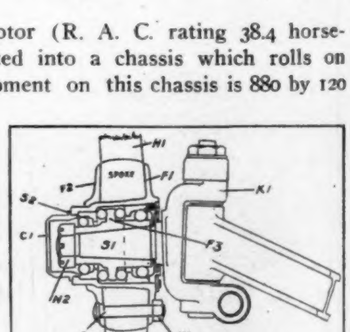



Fig. 3—Sketch of the front wheel and knuckle, sectioned to depict ball bearings for radial and thrust loading.

(E) The 90-horsepower motor (R. A. C. rating 89.9 horsepower) is a shaft-drive car, with wire-spoked wheels, and a wheelbase of 11 feet 11 inches, with standard tread. The tire equipment is 935 by 135, front and rear, in millimeters.

In addition to the models as above outlined, the six-cylinder Grand Prix is to be remembered, the R.A.C. rating of which is 59.2 horsepower. Then, there are commercial models of the Napier for every conceivable purpose.

It would be difficult to state just which of the Napier models are the most popular, or which have the greatest power. The best way, perhaps, for one who may be interested, will be for him to consult his own individual needs, with the understanding that there is a Napier model to be had to fill substantially every one. In order, however, to bring out the characteristics of the Napier school of design, reference may be had to Fig. 2, of a six-cylinder motor, in which the cylinders C1, C2, and C3 are cast in pairs, have a symmetrical exterior, six holding-down bolts, B1, B2, B3, etc., three of which are on each side of each pair of cylinders, and the flanging is so contrived that imperfections in the section of the casting at the junction of the flange with the wall are aborted, and in the same way, the thicknesses of walls and scheme of design assure perfection of the foundry work, ease and precision of the machining process, and other desirable properties.

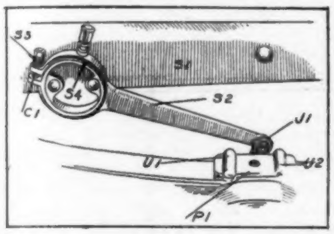


Fig. 5—Sketch of Napier shock absorber, method of applying, and means afforded for taking up lost motion using a spring.

The carbureter, C4, is on the right side of the motor, is especially designed for the desired flexibility of the motor, has means for converting the atomized fuel into gas form before it enters the cylinders, and carbon formations are thereby reduced to an unimportant minimum. The water pump, W1, is located in front of the carbureter, and is driven by a shaft which has two bearings in motor arms, and connects with the half-time gear system, which is in the housing H1.

The lower half of the crankcase, C5, is so shaped that the lubricating oil is held therein, and is circulated through the pipe, P1, by a pump, thence to the journals to be lubricated, and back, thus saving all but the small amount which is burned in the cylinders, with the added advantage, however, that it is properly filtered during each cycle of its travel.

Ignition involves the use of the Napier synchronized accumulator and high-tension magneto. This system is well known for its simplicity, and the excellence of the spark afforded, and require but the use of one coil, in conjunction with a low-tension make and break, with means for perfectly timing the spark. The magneto is especially provided with a synchronized gear-driven mechanism, which renders it fit, without detracting from stability, or adding complication. Referring again to Fig. 2,

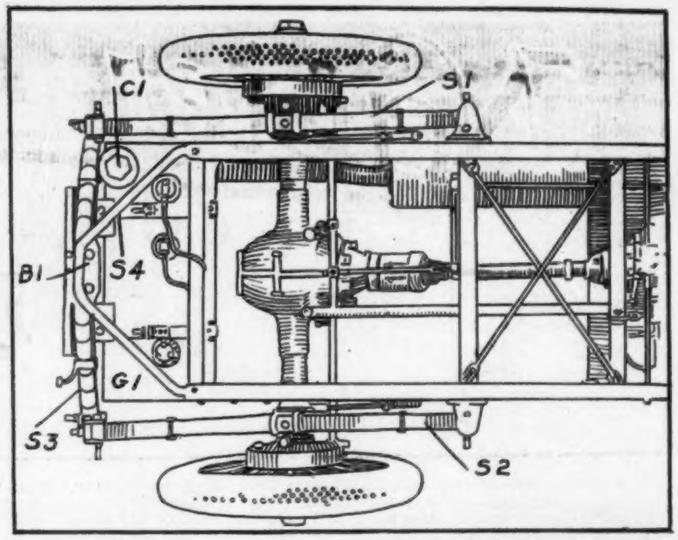


Fig. 4.—Sketch of rear of chassis, showing the long half-elliptic side members and cross member of the platform spring system, live rear axle, rear bracing, and gasoline tank.

it will be observed that the wiring, W2, is suitably encased in a tube, T1, and that the wiring passes out of a box, B4.

Fig. 4 shows the rear of a Napier chassis, with long half elliptic springs, S1 and S2, a lateral spring, S3, at the rear, and a stout support, S4, which takes the work at a midpoint on the lateral spring. A secure bolting system, B1, maintains the position of the lateral spring, S3, and the gasoline tank, G1, is nested under the chassis frame in front of the lateral spring, S3, with a filler cap, C1, in a clear situation, as shown.

Fig. 3 shows the front wheel hub in section, with stout hickory spokes, H1, clamped between flanges F1 and F2, with bolts B1, so arranged that they may be pulled up tight by means of a nut, N1, without causing trouble by turning with the nut. The knuckle, K1, is of the desired proportions, with a tapered spindle, S1, and the double system of ball bearings, the central members of which, being placed to take thrust loads, with a flange, F3, so placed as to interfere with axlewise motion. The hub nut, N2, presses the inner race up against the tapered spindle, and is locked by means of a cotter pin which registers with castellations in the nut. The hub cap, C1, screws up against a shoulder, S2, hence it will stay in place without other locking means.

Fig. 6—Napier taxicab and town car model with a wheelbase long enough to make the entrance commodious and chassis low to match

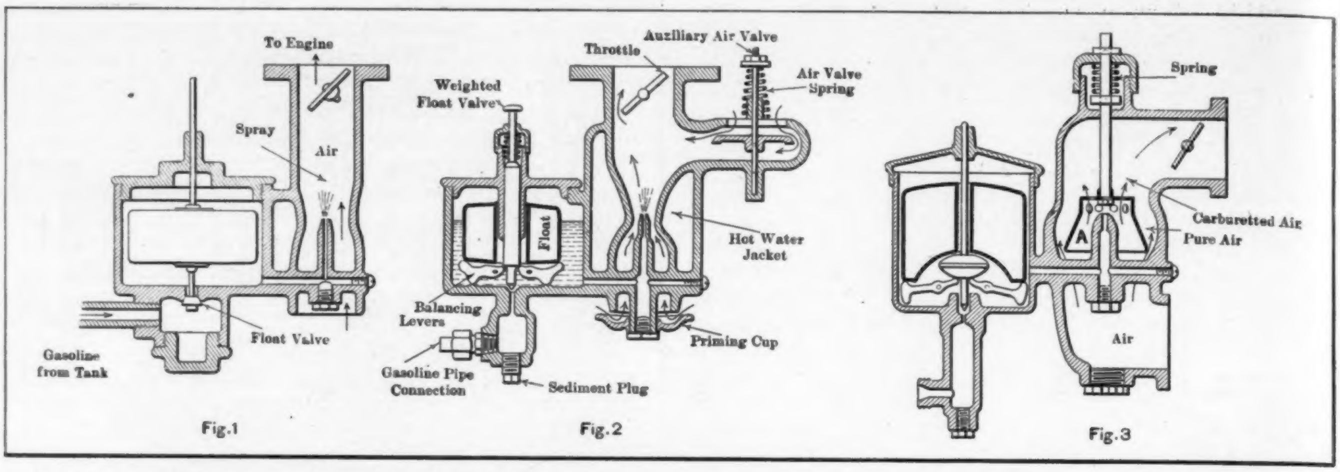



Fig. 1—Elementary non-automatic float-feed carbureter. Fig. 2—Automatic float-feed carbureter having Venturi mixing tube and spring controlled auxiliary air valve. Fig. 3—Automatic float-feed carbureter in which all air enters by one intake. The spring controlled valve A determines by its lift the amount of air which passes around it without taking up gasoline. At low speeds the bottom edge of this valve A almost touches the casing, so that practically all the air goes up past the spray nozzle.

# THE CARBURETER, ITS ADJUSTMENT, AND THE NOVICE

By HERBERT L. TOWLE.

PERHAPS the best advice for the novice regarding his carbureter is to let it alone till he understands something of its working. It is very easy to spoil a good adjustment by random tinkering, and much less easy to restore it.

Nevertheless it is certain that, some time or other, every owner will be thankful to know as much as possible about his carbureter. At best the carbureter is a somewhat delicate device, and cannot be otherwise, from the fact that the forces acting on it are only those of the engine suction. Some time or other—it may be next month or next year—some trivial thing will go wrong. If the owner understands his carbureter he will trace and correct the trouble in a few minutes. If he does not, he will waste hours hunting for it, or pay the too-willing garage man to help him make a mountain of a mole-hill.

It is common prudence, therefore, for the reader to take the first opportunity to learn all about carbureters in general, and his own in particular. You should know what the spray nozzle, float and auxiliary air valve are; how they work and how to get at them; how to drain off sediment, clean the strainer and disconnect the gasoline pipe; what the several adjustments are, and what results may be expected if they are changed; what changes are likely to be required by variations in weather, altitude and fuel; and, finally, what the symptoms and the treatment are of the commoner derangements to float, gasoline supply and air valve. Although the information last named cannot come first it is quite as important as the preceding to your peace of mind and economy of purse.

In Fig. 1 is shown an elementary type of carbureter, now obsolete, but the basis of most modern types. It works on the principle of an atomizer, air being sucked past a nozzle from which a jet of gasoline is aspirated. The normal gasoline level is kept just below the nozzle by a float controlling a valve through which the gasoline must pass on its way from the tank. The tank is placed higher than the carbureter or else is under air pressure to lift the gasoline. This type of carbureter is unsatisfactory for two reasons:

1. When the engine is running slowly the velocity of the air past the spray nozzle is not sufficient to draw gasoline, or to break it into spray, if drawn. To increase the air velocity at slow speeds, the passage around the spray nozzle must be constricted, and that would reduce the capacity of the carbureter at high speeds.

2. When correctly adjusted for low speed, too much gasoline is delivered at high speed. This fact is due to liquids and gases obeying different laws of flow. To a certain extent this difficulty may be met by using special forms of nozzle orifice.

To overcome both objections at a stroke the automatic carbureter was devised, a common form of which is shown in Fig. 2. Here the air passage around the spray nozzle is constricted so much that a small flow of air will produce a spray. To admit sufficient air for high speeds, and at the same time to dilute the carbureted stream—which, as above noted, is too rich at high speeds—pure air is admitted through an auxiliary valve which opens only when the suction exceeds a certain amount. The lift of this valve and the quantity of air passing through it depend on the suction, the form of the spring, and the shape of the air passage around the valve. When properly proportioned this carbureter will deliver gasoline and air in nearly constant ratio at all degrees of suction within its range. To arrive at the correct proportions, however, is a difficult matter, and not all carbureters

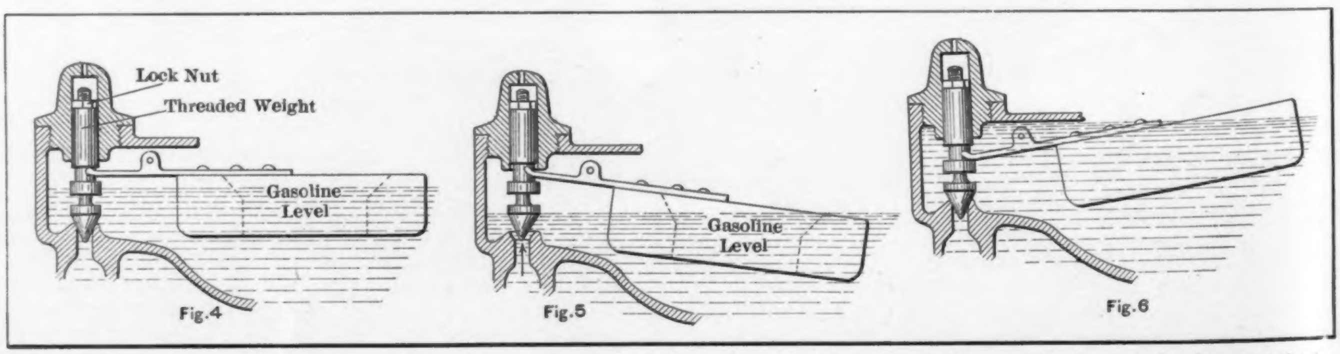



Fig. 4—Simple type of float and float-valves with gasoline level normal. Fig. 5—The same, with low gasoline level, showing how float-valve opens. Fig. 6—The same, with leaky float-valve. The float rises but cannot check the leak, and float chamber floods

are equally successful in that regard. The common adjustments are four in number:

1. The float valve, which regulates the gasoline level.
2. A needle valve controlling the size of the spray orifice (not shown in Fig. 2).
3. The tension of the spring controlling the auxiliary air valve.
4. A stop limiting the extreme opening of the latter.

Raising the gasoline level makes it easier to start the engine, but if carried too far causes gasoline to run continuously from the nozzle. Opening or closing the needle valve controlling the spray orifice gives more or less gasoline throughout the entire range of action. The auxiliary air valve spring is under some tension when the valve is closed, therefore a certain suction is required to open it. This compels all the air to go past the spray nozzle at low speeds. The exact form, length and tension of the auxiliary valve spring have a great influence on the opening of the valve at different degrees of suction. Slackening the spring obviously permits the valve to open more or at a lower suction, and vice versa. The function of the stop is to prevent the valve from opening too much under high suctions. The object of this is partly to prevent fluttering of the valve, but chiefly to prevent excessive air from being drawn in. If the spring controlling the valve is of equal diameter throughout its length, and but one spring is used, the valve will open too much at high speeds unless arrested by the stop. This fact is met in most recent carbureters by making the spring conical, so that its resistance to bending increases progressively, or by adding a second and stiffer spring which comes into action when the valve is partly open. Such a valve is much more nearly automatic than that with the simple helical form of spring.

Starting from the typical form in Fig. 2, modifications of detail have been indefinitely multiplied. Some carbureters have two or more separate nozzles and mixing tubes, one large, one small, of which the smallest starts first with the weakest suction, and the second and others (if any), are brought into action successively as the suction increases. In some carbureters, bronze balls seating over holes of different sizes take the place of the spring-controlled air valve and open one after another. In still others, all the air enters by a single primary opening, but divides, part of it going past the spray nozzle and taking up gasoline, while the remainder is shunted around the spray nozzle and dilutes the carbureted stream. The automatic valve acts on the pure air supply only, increasing it with the suction. An example of this form of carbureter is shown in Fig. 3. The auxiliary valve has somewhat the form of a bell, and is attached to a stem controlled by spring. As the suction increases the bell lifts and more air passes under its lower edge to join the carbureted stream coming through perforations in the upper part of the bell.

Whatever his carbureter, the novice can with a little trouble identify its various elements; and, aided by sectional illustrations, he can learn how to get at them for inspection. The internal parts most apt to need attention are the strainer (if any), located usually between the gasoline pipe and the carbureter, but sometimes built in underneath the float chamber; the float valve and float, and the spray nozzle. Of these the strainer needs occasional cleaning; the float valve is adjustable to vary the gasoline level; the float needs no attention unless it becomes soaked with gasoline, or punctured (if of metal); the spray nozzle takes care of itself unless choked by a particle of dirt, which must be poked out with a wire. Besides these are the sediment plug or petcock; the needle, if any, adjusting the spray nozzle, and the air valve spring and stop, all of which are external and visible.

We come now to the minor adjustments needed by any carbureter owing to changes of weather and the like. Few carbureters are as efficient on a very wet day as on a dry day, on account of the reduced capacity of the air to absorb further moisture. For this reason an excess of gasoline must be supplied by increasing slightly the needle valve opening of the spray nozzle, if there is one. Carbureters having no spray needle are provided with other means of regulation, usually by modifying the suction at which the auxiliary valve opens. To produce an effect similar to enlarging the auxiliary air valve spring tension is increased, thus admitting less air.

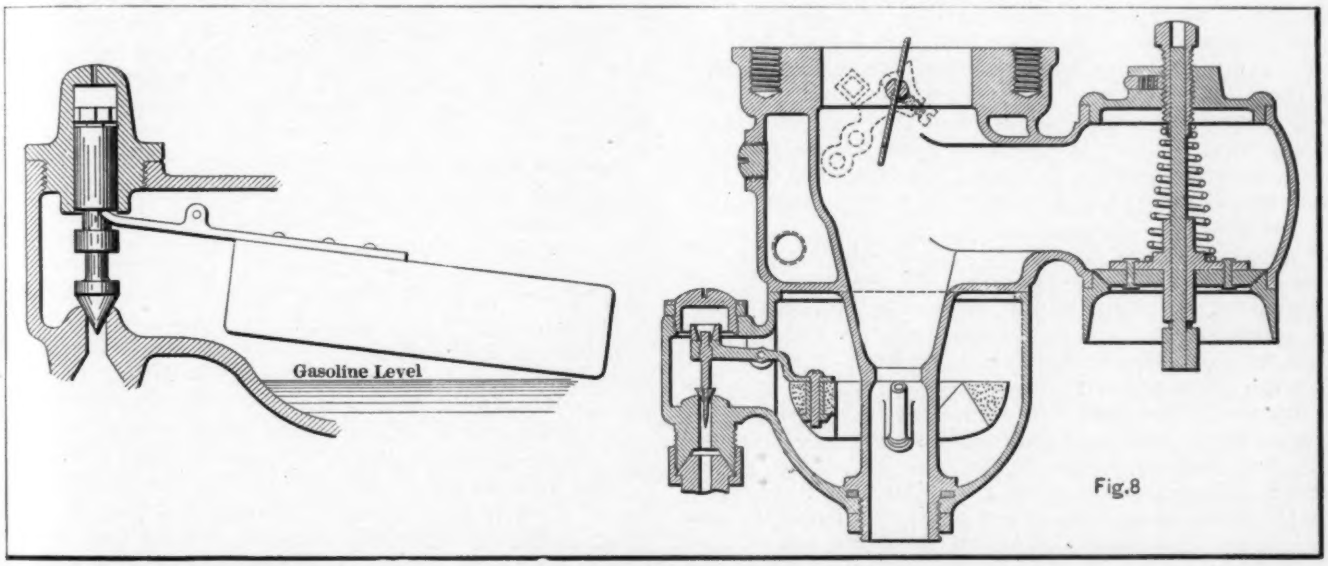



Fig. 7—The same. Threaded weight on float-valve stem is loose, and the stem settles downward by gravity and shuts off the gasoline despite depression of float. Fig. 8—Section which shows how the float relates to the other parts

A change in fuel density always demands readjustment, sometimes of every adjustable element, in order to get the best possible results. If the gasoline be heavier the float will ride higher and therefore maintain a lower gasoline level, thus demanding the adjustment of the float valve. As the heavier gasoline is more viscous the spray opening may need to be slightly enlarged. Additional heat is likely to be required. A marked change in altitude is another thing which sometimes upsets carbureter equilibrium.

Every owner has to change adjustments more or less from winter to summer, although the best carbureter is that requiring the least change. Gasoline, like any other liquid, absorbs heat on evaporating, and unless the air and surrounding piping are warm enough to supply the heat easily the air may be so chilled as to freeze the moisture contained in it. The ice thus formed will choke the mixing chamber. To prevent this, many carbureters are "hot water jacketed."

*(To be continued.)*

# Test of Franklin Air-Cooled Motor*

By L. R. Evans, M.E. and R. P. Day, M.E.

MATERIAL for this article was taken from a thesis, the work on which was done by the writers in 1907 at Sibley College, Cornell University.

The main object of the work was to study the variation in the volumetric efficiency of the motor caused by changing the timing, the shape and size of the valves and the material used for the cooling fins. Several additional items were observed during the tests so that we were able to compute other results. The complete engine and transmission were furnished by the manufacturers from their 1907 stock. They also sent two additional sets of cylinders having different cooling fins or valves. Each set of cylinders was put on the same crankcase and tested in the same way.

The following is a brief description of the engine and the method of making the tests:

**The Engine**—For clearness it may be advisable to give a description of the motor on which the tests were conducted. It is of the four-cylinder, four-cycle type, with a 4-inch bore and stroke and a rated capacity of 20 horsepower at a piston speed of 1,000 feet per minute. The cylinders are cooled by radial flanges, either cast integral or shrunk on to the cylinders, a fan being used to force air between them while the flywheel is designed to further increase the draft. The boot, hood and footboard are all designed so as to give air a direct passage from front to rear.

Three different sets of cylinders were used in the tests, each being of a different design. The first set was made of close-grained cast iron with the cooling fins cast integral with the cylinder shells. The second and third sets were cast-iron shells with very thin walls, carefully machined on the outside, on which phosphor-bronze flanges were shrunk to form the cooling fins. These disks were spaced equally on each separate cylinder, but the number of discs on the various cylinders varied with their positions relative to the fan. No. 1, the forward cylinder, had 12 fins, Nos. 2 and 4, 14, while No. 3 had 17. the purpose of this design being to keep all the cylinders at the same temperature, approximately. The first and second sets of cylinders had flat heads with two openings for valves which were separate, while the third set had spherical heads with one opening in which the valves were placed concentrically—that is, the exhaust valve was placed within the inlet valve, which formed its seat.

*Paper to have been read at the Winter meeting of the Society of Automobile Engineers, 1909.

**Pistons and Wrist Pins**—The pistons were cast of the best quality of close-grained gray iron and were finished on the outside by grinding, the inside being left rough. Each piston was provided with three eccentric piston rings, made of cast iron and ground to fit the cylinders. Hollow wrist pins made of cold rolled stock, hardened and then ground, were used in each case. They were held in place by cotter keys and were kept from rotating by means of small tool steel pins set crosswise in their ends so as to mesh with a slot cut in the pistons.

Connecting rods were made of nickel steel, drop forged with an elliptical section. The crank end was fitted with a split babbit bearing held together with four cap screws while the wrist pin end was bushed with a bronze bearing, pinned in place to prevent rotation.

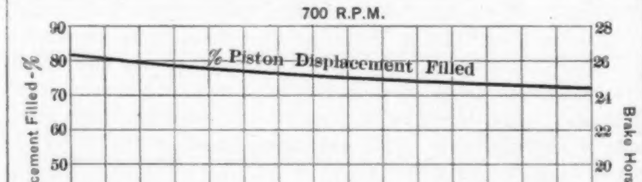
Crankshaft was made of the best quality nickel steel, drop forged and finished by means of lathe and grinder to 1.5 inch at both the crank and the connecting rod bearings.

**Crankcase and Main Bearing**—The crankcase was cast of a special aluminum alloy, being finished inside and out by means of a boring mill and milling machine. The main bearings, five in number, were made of die cast babbit with aluminum alloy pedestals.

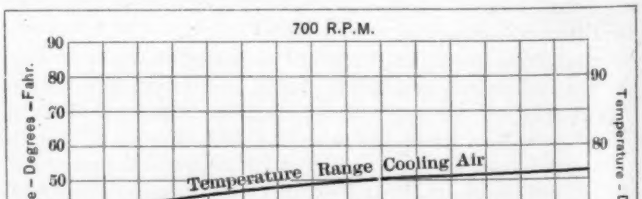
**Flywheel, Clutch and Fan**—The flywheel, which was made of iron cast with blades instead of spokes, also carried a clutch of the multiple disc type with alternate bronze and steel discs. The six-bladed aluminum fan was gear-driven from the main shaft by two to one bevel gears, the fan being connected to its drive shaft by means of a friction clutch, so as to minimize the strains induced by sudden stoppage of the engine.

**Valves and Mechanism**—The valves were three in number, all mechanically operated; the inlet valve, the exhaust valve and the auxiliary exhaust valves respectively. The inlet and exhaust valves were placed in the heads of the cylinders, while the auxiliary exhaust valve was connected to a port so placed in the cylinder that when the piston had moved through seven-eighths of its stroke, the port starts to open. Through this port nearly all of the products of combustion escaped so that but little was left to pass through the true or main exhaust valve. It is to the auxiliary exhaust that the successful cooling of the motor is almost entirely due.

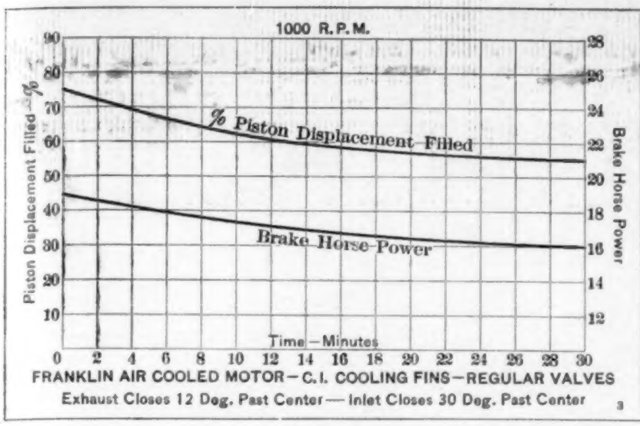
The first two sets of cylinders had separate valves for both inlet and exhaust in the head, but the last set tested were fitted with concentric valves. This form of valve gave a larger area of opening for the inlet valve and hence a greater charge of



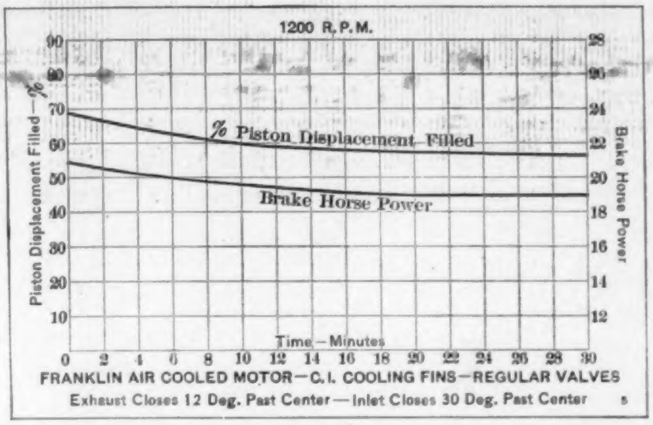

**Horsepower in Constant Relation to Cylinder Filling**




**Temperature of Cooling Air Soon Reaches a Maximum**




Cylinder Filling Not So Good at Higher Motor Speeds




Horsepower Becomes Constant After 18 Minutes' Running

mixture was introduced into the cylinders by each suction stroke, with a consequent increase in the power of the engine. In all cases the valves were actuatd by eccentric cams, through push rods and walking beams, so linked together that the motion of the valve was about twice the movement or throw of the cam.

**Timing**—The first set of cylinders was tested with the valves timed in two different ways. First, the valves were timed so that the inlet valve opened 7 degrees before center and closed 17 degrees past center, while the exhaust opened 13 degrees past center and closed on center. This has been called timing A. Next, the relative position of the two-to-one camshaft gears were changed by one tooth so that the inlet valve opened 5 degrees past center and closed 30 degrees past center, while the exhaust valve opened on center and closed 12 degrees past center. This has been called timing B. The auxiliary exhaust valves were always timed so as to open about the middle of the expansion stroke.

**Carbureter**—The carbureter was of the float-feed type with a multiple jet gasoline nozzle placed in the center of a Venturi tube. A butterfly throttle valve was used, connected to which was a second valve of the same type that controlled the opening of a by-pass through which air could be drawn around the nozzle. By means of the auxiliary air which did not pass the nozzle, the proportions of the explosive mixture were approximately maintained constant for all speeds of the engine. The float feed was so adjusted that the gasoline level was about 1-8 inch below the top of the spray nozzle at all times. The supply of gasoline to the spray nozzle was controlled by a needle valve which was operated from the dashboard. A flap valve was placed in the intake pipe of the carbureter in order to furnish sufficient suction when the engine was cranked to start. This valve drops down and closes the intake pipe and a greater suction is produced in the carbureter with the result that a much richer mixture is available for starting. After the engine is cranked, this valve opens and remains open.

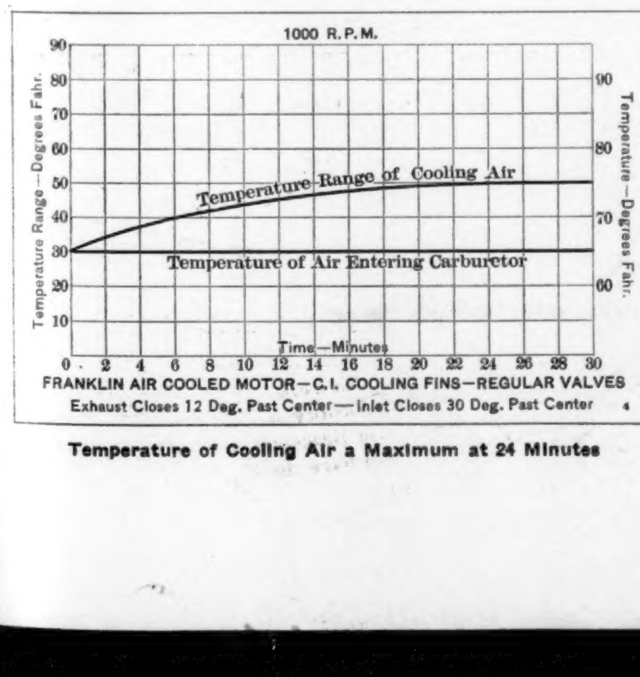
**Ignition**—The ignition system consisted of a Pittsfield four-unit spark coil, mounted on the dash, a Pittsfield timer and a Witherbee storage cell. Pittsfield spark plugs with mica cores were used throughout the test. In the first set of cylinders the plugs were placed in the sides, but in the last two sets they were placed in the tops of the cylinders as nearly central as possible. The timer was so adjusted that the time of ignition could be regulated to suit any speed of the engine.

**Lubrication**—Splash and force-feed lubrication was used in this motor, the engine being provided with a sight and force-feed McCord oiler mounted on the dash and belted to the end of the camshaft. Two pipes were run to the center portions of the crankcase, while the remaining two were connected to the rear main bearing and the fan gearcase respectively. Throughout the test Floyde 600 degrees fire test lubricating oil was used in the oiler, while from time to time a small quantity of powdered graphite was placed in the crankcase.

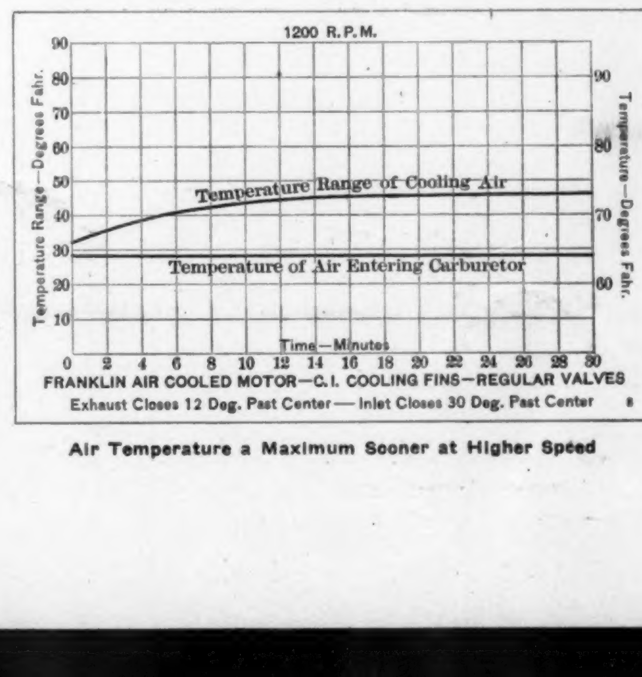
**Control**—The engine was provided with a spark and throttle control, and the necessary levers were mounted on the dash and on the engine, being connected to the timer and throttle respectively. In addition to this, a governor, which was mounted on the camshaft ,was connected to the throttle valve in such a manner that the engine was prevented from racing when the load was suddenly removed.

Transmission was of the progressive sliding-gear type, with three speeds forward and one reverse. On the high speed, the crankshaft of the engine was directly connected to the drive-shaft of the transmission and it was this speed that was used throughout the test, the drum of the Prony brake being mounted on the end of the transmission driving shaft.

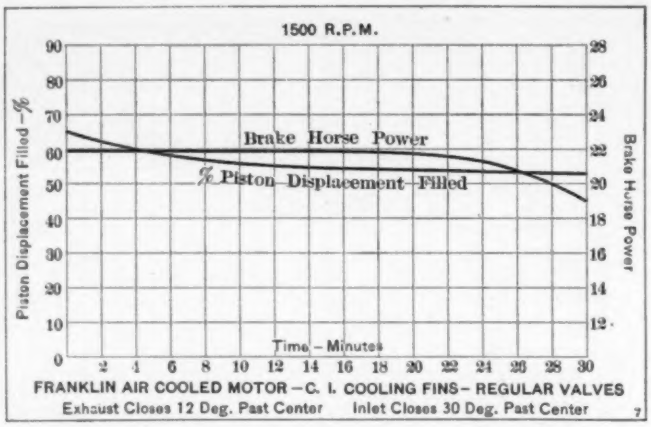
General arrangement of the apparatus was this: The air drawn into the engine through the carbureter was measured by a Wylie air meter, manufactured by the Equitable Meter Company, of Pittsburgh, Pa. A large air receiver was connected in the line to steady the flow of air. The gasoline was drawn from



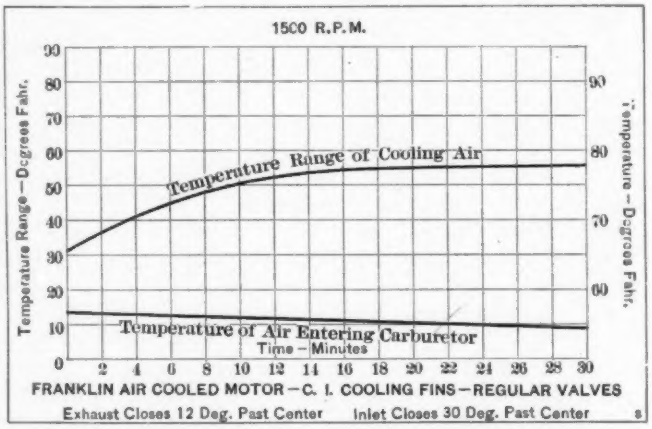

Temperature of Cooling Air a Maximum at 24 Minutes



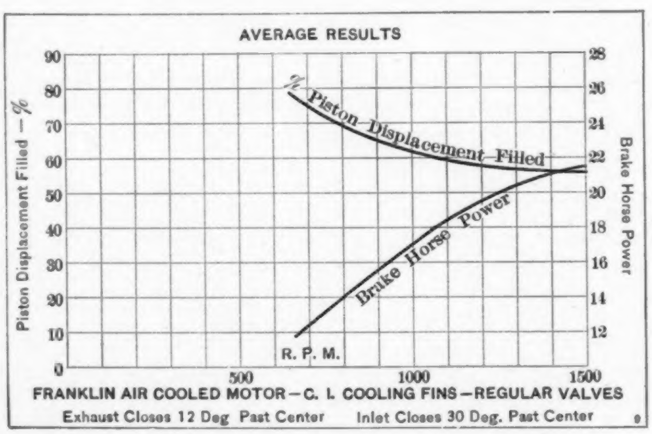

Air Temperature a Maximum Sooner at Higher Speed



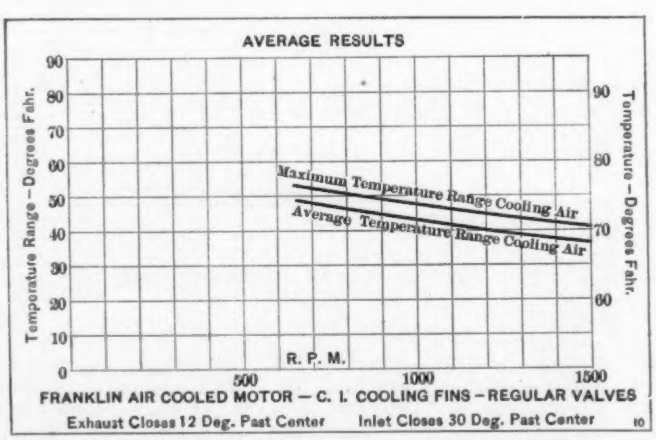

Cylinder Filling and Horsepower Diverge at 1,500 R.P.M.



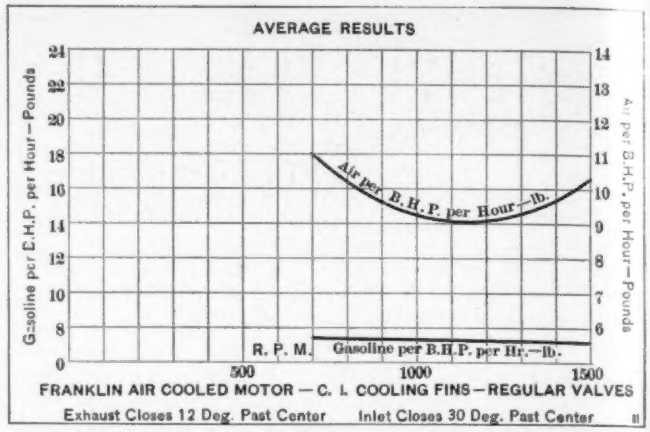

Still More Rapid Maximum of Cooling Air Temperature




Curve of Horsepower Droops Rapidly Above 1,100 R.P.M.




The Curves Are Not Parallel, Owing to Different Scales




Explaining the Need of Entirely Automatic Carbureters

a calibrated tank outside the building. The energy was absorbed by a Prony brake.

The air meter was calibrated by the manufacturer and also, under the conditions of the test, by an electrical measuring device contained in the 5-inch pipe connected between the meter and engine. The results of these two calibrations showed that the meter was correct within the range used during these runs. The lower heating value of the gasoline used was found by test to be 18,480 B.t.u. per pound.

**Description of Test**—The general object and method of procedure used in obtaining the data for the different runs is best shown by the following outline on which the tests were based:

Object: Study of volume and weights of air drawn into motor.

Method: By metering the carbureter air.

Plan: A. Cylinders with cast-iron cooling fins and separate valves were placed on engine and the effect of temperature and valve timing on the volume of fuel mixture drawn into engine was determined.

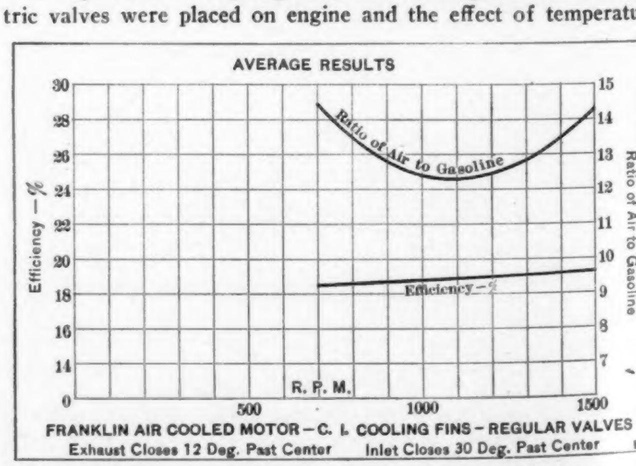
a. Accurate data was obtained with valves timed regularly timing B (exhaust closes 12 degrees past center and inlet closes 30 degrees past center), 30-minute tests being run at speeds of 700, 1,000, 1,200 and 1,500 r.p.m., with readings taken every two minutes.

b. Camshaft gears were shifted one tooth so that exhaust closed on center and inlet closed about 17 degrees past center, timing A. Tests were made at speeds of 700, 1,000, 1,200 and 1,500 r.p.m.

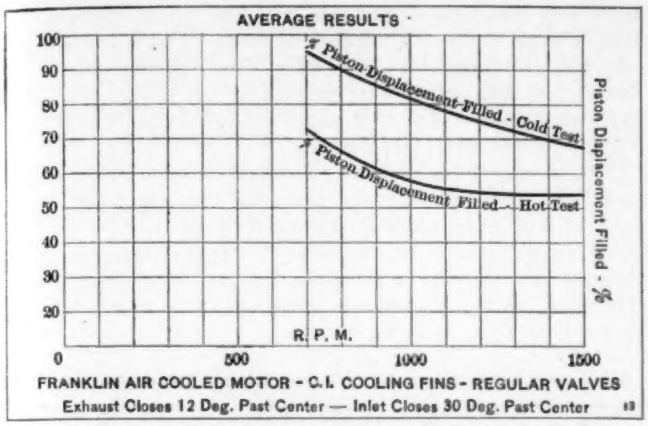
B. Cylinders with phosphor-bronze cooling fins and separate valves were placed on engine, and the effect of temperature and valve timing on the volume of fuel mixture drawn into engine was determined.

a. Tests according to (A-a) above were run off.

C. Cylinders with phosphor-bronze cooling fins and concentric valves were placed on engine and the effect of temperature




Proportions of Mixture Vary with Constant Efficiency



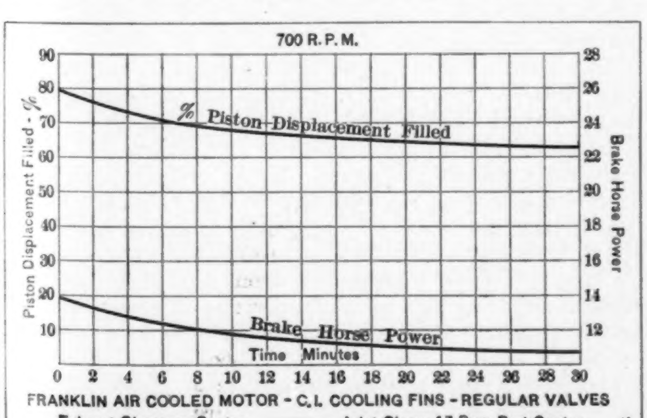

**Showing the Effects of Running Both When Hot and Cold**

on the volume of fuel mixture drawn into engine was determined.

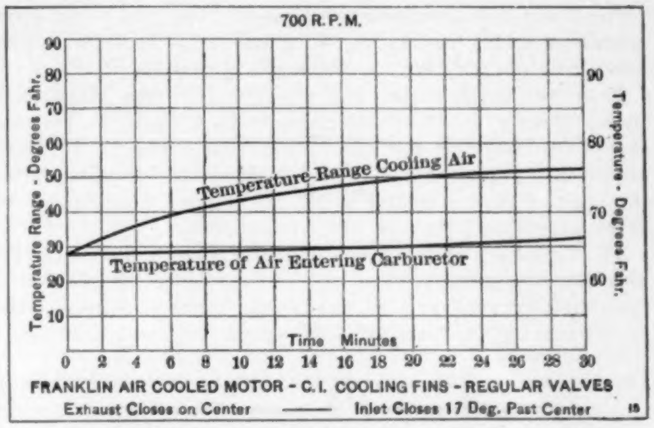
a. Tests according to (A-a) above were run off.

All of the tests, which were of one-half hour duration, were made as follows: Starting with the engine cold and the throttle wide open, the spark, carbureter needle-valve and the brake were adjusted so as to give maximum power at a given constant speed, at which the run was to be made. Then the gasoline tank gauge and air meter were read and the continuous counter, having been set at zero, was engaged with the brake drum shaft. During the run the following readings were taken every two minutes: Air meter, continuous counter, brake scales, temperature of air entering carbureter, temperature of air entering hood of engine, temperature of air leaving hood of engine, pressure in air receiver, pressure in suction header and temperature of gasoline. At the end of the run the air meter and the gasoline tank gauge were read, the continuous counter was disengaged from the shaft and the specific gravity of the gasoline was determined.

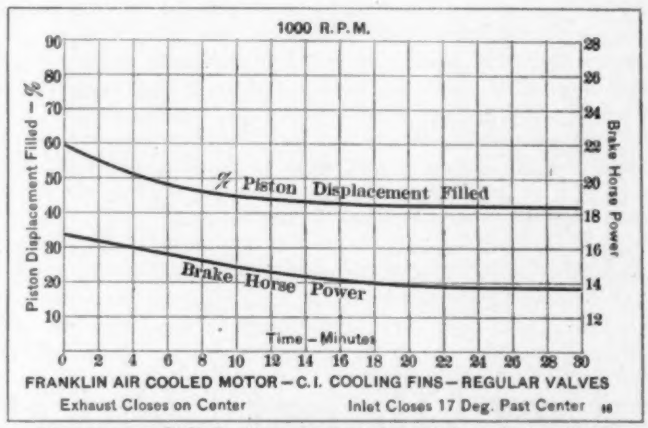
The results appearing in this article were computed from a large mass of data selected as follows: The engine was first put into such condition that it would pull the proper maximum horsepower at 1,500 r.p.m., then a complete set of tests, as, for instance (A-a), were made, starting with 1,500 r.p.m. At the end of each run the engine was carefully inspected for leaky valves, faulty ignition, etc., and the valves timed hot immediately after the engine was stopped. After satisfactory data was obtained for the four runs of the set, check runs were made precisely similar to the first. Then from the checked data, that data which was most consistent was selected for computation. Whenever, as frequently happened, the second set of runs did not check the first, then more runs were made until two runs were obtained that did check. Sometimes it was found necessary to make as high as seven runs before satisfactory data was obtained. It was hoped that in this manner all sources of error would be eliminated. As a further precaution, the engine was torn down and completely rebuilt after the data for each series



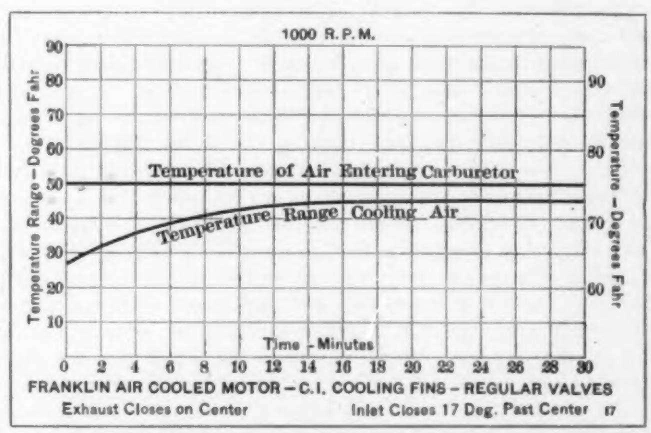

**Horsepower Much Impaired by the Change in Valve Timing**



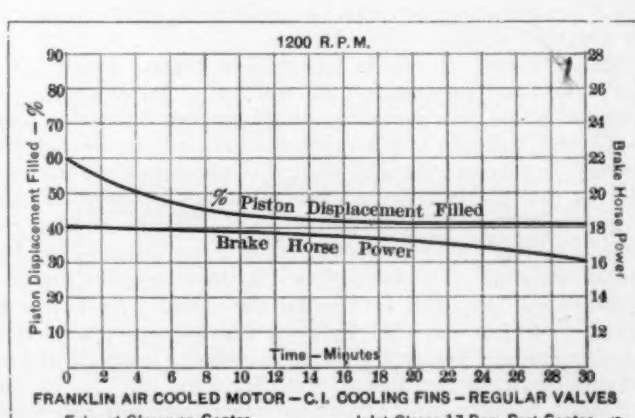

**Greater Relative Increase in Temperature of Air Used**




**Horsepower Still Further Reduced at Higher Motor Speed**




**Cooling Air Slower in Reaching Its Maximum Temperature**




**Shape of Horsepower Curve Much Changed by Valve Timing**

of tests had been satisfactorily obtained. The data is not given because it would take up too much space, but in the following table are given the most important average results:

From the results of the first set of tests it was evident that timing B gave so much better results than timing A that the rest of the tests were run with only the one timing B. For each set of runs will be found curves showing the variation during the runs of the temperatures and the volumetric efficiency and other sets showing the ratio of air to gasoline, etc.

The volumetric efficiency is less than 100 per cent., because the valve opening is not large enough and the charge is throttled in entering the cylinder; also because the cylinder is hotter than the entering gas and causes it to expand. In order to separate these two losses, the engine was belted to an electric motor and run at same speeds as during the tests. The spark was shut off, but everything else the same, even leaving the gasoline turned on. The valves were timed with the motor cold. Readings were taken for a half-hour run and from them the cold volumetric efficiency computed.

Sets of curves for each set of runs were plotted showing the volumetric efficiency with the engine hot and cold. The ordinate between the curve for the cold test and the 100 per cent. line is, of course, the loss due to the small valve opening, the ordinate between the two curves being the loss due to the hot cylinder. The effect on the efficiency of changing the timing can be seen by comparing the first two curves.

SUMMARY OF RESULTS IN TEST OF FRANKLIN AIR-COOLED ENGINE USING TWO DIFFERING KINDS OF COOLING FINS

| | Cast-iron Cooling Fins | | | | | | | | Phosphor-bronze Cooling Fins | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Regular Valves | | | | | | | | Regular Valves | | | | Concentric Valves | | | |
| | Timing A, R. P. M. | | | | Timing B, R. P. M. | | | | Timing B, R. P. M. | | | | Timing B, R. P. M. | | | |
| | 700 | 1000 | 1200 | 1500 | 700 | 1000 | 1200 | 1500 | 700 | 1000 | 1200 | 1500 | 700 | 1000 | 1200 | 1500 |
| Temperature of entering air | 65 | 77 | 73 | 66 | 66 | 65 | 64 | 56 | 76 | 76 | 76 | 75 | 77 | 79 | 79 | 79 |
| Temperature range of cooling air | 45 | 42 | 39 | 40 | 48 | 45 | 40 | 49 | 49 | 46 | 44 | 43 | 42 | 43 | 42 | 41 |
| Brake horse-power | 11.75 | 14.78 | 17.39 | 17.65 | 12.4 | 17.13 | 19.52 | 21.4 | 12.2 | 17.9 | 20.5 | 21.85 | 12.2 | 16.8 | 21.4 | 23.2 |
| Weight of gasoline per B. H. P. per hour | 0.804 | 0.777 | 0.742 | 0.778 | 0.74 | 0.728 | 0.724 | 0.721 | 0.842 | 0.710 | 0.705 | 0.772 | 0.696 | 0.755 | 0.708 | 0.830 |
| Air per B. H. P. per hour, cu. ft. | 139 | 106 | 107 | 142 | 148 | 123 | 127 | 137 | 157 | 137 | 137 | 151 | 147 | 130 | 127 | 144 |
| Air per B. H. P. per hour, lbs. | 10.38 | 7.75 | 7.85 | 10.48 | 11 | 9.05 | 9.45 | 10.3 | 11.40 | 9.93 | 9.93 | 11.0 | 10.66 | 9.36 | 9.00 | 10.50 |
| Air per B. H. P. per hour, at 32° F. and 14.7 lbs. per sq. in., cu. ft. | 128 | 96.2 | 97.4 | 130 | 136 | 112 | 117 | 128 | 147 | 123 | 123 | 136 | 132 | 116 | 111.2 | 128 |
| Ratio air to gasoline by weight | 12.9 | 9.85 | 10.56 | 13.5 | 14.8 | 12.4 | 13 | 14.3 | 13.50 | 13.97 | 14.1 | 14.2 | 11.2 | 12.50 | 12.68 | 12.60 |
| Efficiency of motor calculated on B. H. P., per cent. | 17.12 | 17.68 | 18.60 | 17.65 | 18.6 | 18.9 | 19.02 | 19.3 | 16.3 | 19.4 | 19.5 | 17.85 | 14.60 | 18.20 | 19.50 | 16.70 |
| Volumetric efficiency, per cent. | 66.5 | 44.8 | 44.5 | 47.2 | 75 | 60.4 | 58.4 | 55.5 | 78.6 | 66.5 | 66.5 | 63.6 | 73.2 | 62.3 | 64 | 64.8 |

# How Efficient Lubrication Reduces Maintenance

ASIDE from the qualities of oils which have been previously mentioned, there are a number of qualities which are worth mentioning, in fact are spoken of daily. These are the matters of color, fluidity, flash point, fire test and cold test, all of which are of some vital importance. To define and expand upon these will be well worth the space taken up.

Color is a very misleading quantity, because it has very little influence upon the actual worth of the lubricant as a preventer or reducer of friction. When the word light is used in connection with oils, what is meant is the specific gravity and not the color. Color or lack or it is either inherent in the oil, and a result of the process by which it is made, or it is produced by artificial means. Bleaching with acids may result in clearing the color of the oil, but it may also leave traces of acid in the oil, so that the slight benefit to be gained (if any) from this process is attended with much danger. Filtration will achieve the same result with no corresponding drawbacks, so that an automobilist who for some reason desires a light colored or clear oil should insist on one which is either made that way, or in which the result is achieved by filtration.

Specific gravity is usually measured in degrees Baumé, at a known or fixed temperature. The latter is a necessity, since the lubricant would have a variable weight per unit amount, as compared with a standard, in varying weather, such as summer and winter. In other words, cold weather would expand the lubricant just as it does other fluids (barring water), so that the unit weight would be less in colder weather. Figures showing the general average are not available, but as a few instances the following are cited. The Pennsylvania Railroad specifies that one grade of oil (paraffine and neutral oils) must have a specific gravity of 60 deg. Fahr. below 24 deg. and above 35 deg. Baumé. Another grade of lubricant (well oil) must have a specific gravity between 28 and 31 deg. Baumé, at 60 deg. Fahr.

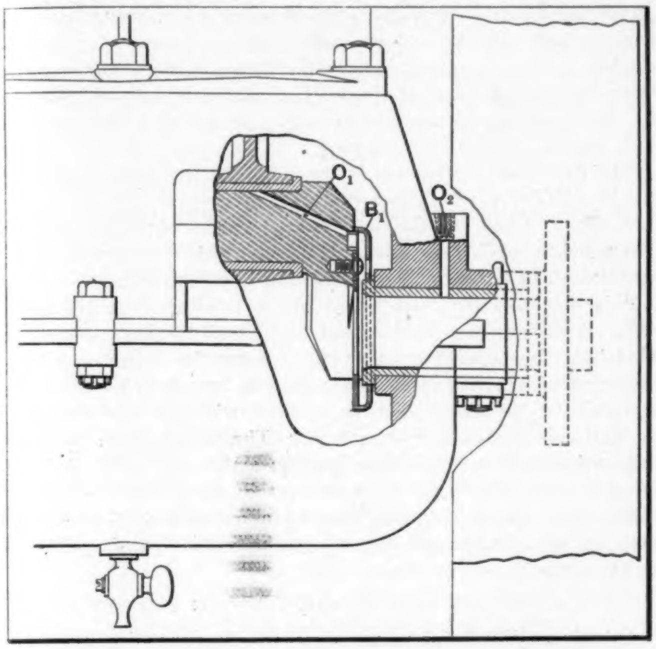
Fluidity is that quality of oils and other lubricants which has previously been discussed under the head of body, that being the more usual term for it. By this, reference is had to the thinness of the lubricant, which produces easy flowing qualities, or the lack of which gives the opposite result, sometimes desirable.

Flash point is a temperature measurement, and is that temperature at which the vapor arising from the surface of the oil will take fire, or flash. That is to say, it is the *lowest* temperature at which the oil vapors will flash. Naturally this is a decidedly variable quantity, the flash point varying with the service for which the oil is intended. Thus, oils for cylinder use should have a very high flash point, while oil for transmission and rear axle bearings may have any old flash point. This quality of oils is closely allied with burning point, or fire test as it is usually called, so that in specifying one the other is usually specified also. Thus, for what is called 150 fire test oil, the Pennsylvania Railroad specifies that the flash point must be above 130 deg. Fahr. and the oil must not burn until the temperature passes 151 deg. Fahr. Another oil known as 300 test must not flash below 249 deg. nor burn below 298 deg. Fahr.

In automobile work, the fire test (and with it the flash point) will bear close watching, for cyinder use in particular. Thus, if an oil has a low fire test, when exposed to the very high temperatures of combustion, it will burn, and thus leave a residue, the presence of which is highly undesirable. This residue is what is known as carbon deposit, and it is very difficult to avoid, but much more difficult to remove. In the ordinary cylinder, the temperatures may run as high as 2,000 deg. Fahr., but such extremely high figures are only momentary, tapering down at one end to an exhaust temperature of perhaps 300 deg. Fahr., and at the other a varying temperature, which may be as low as the external air, or as high as the temperature of compression, just before explosion. The latter figure might be in the neighborhood of 125 deg. Fahr.

This gives a range of temperature of from, say, 60 to 125 deg. for the suction and compression strokes, jumping to 2,000 at explosion, falling off from that figure to 300 at exhaust, and then

repeating. The lower temperatures prevail for two strokes, or one-half of the whole cycle, while the highest temperature prevails for but an instant, so that the average temperature which would be effective for this part of the cycle might be taken as close to an average of the initial and final temperatures, or in the case cited above, 2,000 and 300, or, say, 1,100 deg. Fahr. Doubtless




Ring Oiling Scheme for Lubricating the Crankshaft Bearings

a much lower figure would be more fair, for the pressure and with it the temperature falls off very rapidly, not only at the start but throughout half of the stroke, slowing down to a very gradual drop only at the end of the curve, just before the exhaust opening point is reached. For these and other thermodynamical considerations it would be well to consider the average value of the cylinder temperature during the power stroke as closer to 850 deg. Fahr. than to the figure previously given.

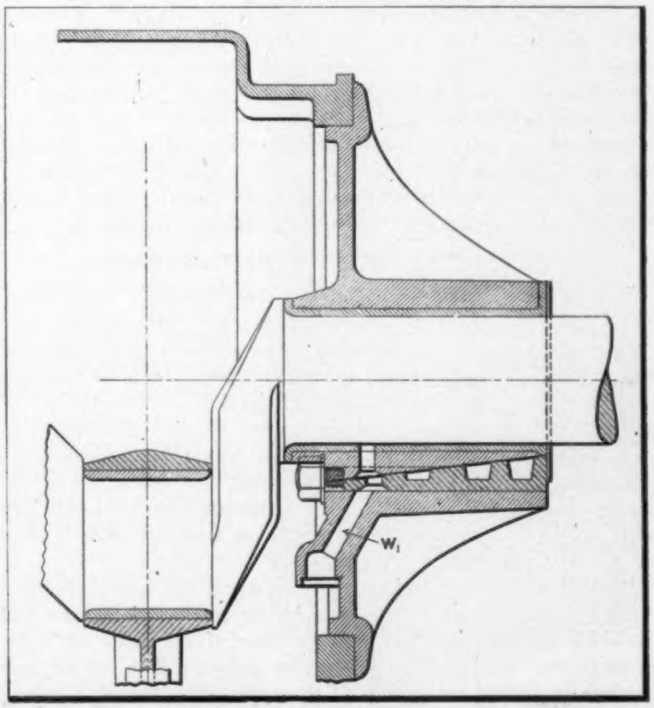
Following this line of reasoning, if the suction stroke be considered as varying from a remanent temperature of, say, 100 down to a final temperature of the mixture of 60, the average is 80 deg. The compression varies similarly from 60 up to 125, an average of say 90 deg., while the exhaust varies from, say, 300 down to 200, an average value of 250. If these four average temperatures be averaged over the whole four strokes, a figure of 315 deg. Fahr. is gained for the whole average cycle temperature. This, then, would be a good minimum value to assign to cylinder oils, bearing in mind at the same time the fact that this is momentarily exceeded by perhaps as much as 1,800 deg. Without a doubt, the above line of reasoning leads to the conclusion that cylinder oils should not have a lower fire test than 400 deg. Fahr., while a higher figure is, to say the least, on the side of safety.

Cold test is a quality not spoken of as much as the others, that is to say, it is generally neglected; this, too, without cause, for it is important. Cold test consists of testing the oil to see at what minimum temperature the oil will congeal. This is tested by gradually lowering the temperature of the oil, and noting the first point at which it ceases to flow readily. For winter use, however, the determination of the quantity is of much greater importance, and so is determined by another method. For this purpose the method employed is as follows: The oil is frozen, and then the temperature is gradually raised until a point is reached at which the frozen oil will just flow. This then is taken as the cold test point. Motorists in selecting an oil for winter use, other than for those parts like the cylinder, which keep the oil warm at all times when in use, should be selected according to the part of the country in which the car is to be used. Thus, for the average Northern United States location, a cold test of 10 deg. Fahr. would be sufficient, while Canada would require a lower figure of, say, 5 deg. down to zero.

On the other hand, the Southern States would not need such a low point, and since this quality influences the fluidity, otherwise called body, to a large extent, it is desirable to keep the cold test as high as possible so that the body qualities may be of the greatest possible use to the motorist. This then leads one back to the starting point, that is, to the statement that the cold test is generally neglected, and indicates a reason why it is neglected, namely, to gain all of the benefits of fluidity. However there is no reason why it should be entirely neglected, for it is possible to select the oil with care, and gain the maximum advantage with the minimum disadvantage.

To sum up, then, the points to be examined are: Identification of the lubricant as an animal or mineral oil, or a compound, as a solid lubricant or a compound of solid with fluid; density or specific gravity; viscosity; flash point; burning point; acidity; coefficient of friction, and cold test. These eight qualities are given in very nearly the proper order of importance, although nothing is said about cost, which in the usual case ought to be listed just as all other qualities. That is, instead of making it the main or deciding factor, it should have no more weight than any one of the eight other qualities, or, if desired, it may be inserted in the list above, giving it a place according to its worth.

When a man makes price the deciding factor in buying oils he makes a big mistake, for that should be second to quality. If economy were the real item, it would be better to go without oil. In considering price it should be valued according to two things; first, the actual cost of the oil itself, and second, the actual cost of the repairs or replacements which its use will entail, or did entail, in some period of time. Upon this basis, the best oil will be selected regardless of price every time. More than this, another slant is given the oil-buying question by this idea. If the oil be cheap, too cheap, so that the quality is poor, the amount of power lost in friction will be very high. This power loss will not be noticeable in repair bills, but it will appear, nevertheless, in upkeep bills, gasoline, oil, waste, etc. It can be checked up rather carefully by observing the mileage per gallon of fuel, using several different kinds of lubricant. Finally, every driver who is vitally interested in the subject of proper lubrication should keep tabs on all kinds of oil used and the results.




Another Bearing Lubrication Method as Used on Rambler Cars

# FRENCH BUILDERS FAVOR SMALL FOUR-CYLINDER MOTOR

By W. F. BRADLEY

PARIS, March 21—After developing the one-lunger to a wonderful degree of efficiency, French small car builders are now showing a decided preference for four-cylinder motors of very small volume and low, or moderate power. An example of this is to be found in the conversion of the firm of Sizaire-Naudin, to the multiple cylinder idea, after several years devoted exclusively to the development of the one-lunger. The new production will be examined with particular interest from the fact that the firm has met with phenomenal success in the single-cylinder class, and has produced single-cylinder racers with a ratio of stroke to bore, which a few years ago would have been declared impossible. With a bore limited to 3 9-10 inches, the firm has shown how to make a nominal 8 horsepower develop 26 horsepower and break all speed records for its class. Part of the result is due to a stroke of 10 inches, relatively large valve diameters, light reciprocating parts, efficient lubrication, and the use of the most appropriate of metals.

The new four is the outcome of racing and touring experience with monocylindrique motors. Nominally, it is of the same power as the firm's single-cylinder model and can be fitted under the same bonnet without any structural changes. The four cylinders have a bore and stroke of 70 by 120 millimeters (2 7/10 by 4 7/10 inches) and though rated at 12 horsepower, has developed as high as 26 horsepower, on a 10 hours' bench test. The bore is long in relation to the stroke, but is short in comparison with a second motor already designed and tested on the road, and intended for next season's market, in which, for the same bore, the stroke is carried up to 170 millimeters, or 6 7/10 inches. This is the greatest ratio of stroke to bore that has ever been attempted on a car designed for the ordinary user.

### CYLINDERS CAST EN BLOC A FEATURE

Block casting of the cylinders, thermo-syphon water circulation, high-tension ignition with fixed sparking point, are all modern features which have been adopted on the new Sizaire-Naudin. A distinctive feature is that the crankcase is divided into two parts vertically, and not horizontally, the two halves being bolted together, and each one carrying a ball bearing for the crankshaft, as in single-cylinder design. Naturally there is no central bearing, but this cannot be considered a novelty, in view of the fact that most constructors of small motors have decided that two bearings only are preferable. The use of ball bearings for the crankshaft, however, is new, Sizaire-Naudin being the only French maker of small motors to use other than plain bearings for the crankshaft. They have been led to this move by their experience with the high-powered 100-millimeter single-cylinder racing motors, all of which had ball bearings throughout.

### INTEGRAL CAMSHAFT ON BALL BEARINGS

The camshaft, too, is mounted on ball bearings, and is machined out of the solid with integral cams. Although all eight valves are mechanically operated, there are only four cams for the entire set. The valves are superimposed, the inlets being inverted over the exhausts, and all having a diameter of 50 millimeters, compared with 70 millimeters for the cylinder. This is a much larger valve diameter than would be possible with the valves side by side on such a closely set motor. The exhausts are operated from below by tappets, according to standard practice, the only distinctive feature being a considerable lead to the exhaust opening.

Parallel with the camshaft, but on a slightly lower plane, is a fixed shaft on which are mounted four small rockers, one end of which comes in contact with the face of the cam, while the opposite end touches the intake valve tappets. The rocker arm is made to follow the profile of the cam by reason of a spring on its under face, just below the tappet. A spike-like projection on the tappet centers the spring, the lower seating of which is on the upper face of the crankcase. Holes are bored in suitable positions on the face of the crankchamber to receive these projections when this end of the rocker arm is depressed. Considered in a vertical plane, the camshaft has above it the exhaust valve tappet, and below it the small rocker arm operating the inlet valve tappet and the inlet valve by means of a vertical push rod, and an overhead rocker arm.

The overhead mechanism is the one that has been applied to single-cylinder models since the beginning, and has only been modified in detail for the new work it has to perform. On the cylinder head is bolted a steel housing which also serves as intake manifold. It is in two parts, each one receiving two valves, and is held down by five bolts. A lip is formed on the outer face of the housing, under which is slipped the lower bar of a steel link, the upper bar of which receives the rocker arm. At each end of the rocker arm is a socket, into one of which the extremity of the intake valve is received, while the other receives the ball end of the vertical push rod. The extremity of the push rod is threaded onto the main portion and locked with a couple of nuts, thus allowing for adjustment of the tappets. The exhaust valve springs being hidden by a movable steel plate, the only visible parts in movement are the vertical push rods and rocker arms.

### IGNITION BY HIGH-TENSION BOSCH MAGNETO

A high-tension Bosch magneto is relied on for ignition. On the model described, it is in a very low and inaccessible position, driven by external gears. It has been decided, however, to raise it to the level of the frame members for more convenient examination. The instrument is a new model just produced by the Bosch company and remarkable for its small size. It is considerably smaller than the one employed on the single-cylinder models and is provided with glass inspection plates for verifying the contacts, without dismounting. The leads pass through a straight metal tube level with the base of the cylinders until they come opposite their respective plugs, from which point the insulated cable is passed up to the sparking plug. The only visible wiring therefore consists of four vertical lengths. At present a Zenith carbureter is employed, but will be changed later for one of the firm's own design.

Unusually large diameter inlet and outlet pipes are used for the water circulation. The supply of cooling water is contained in a plain vertical tube radiator, at the back of which is a large brass tank supplying a good head of water for the cylinders. The tank is only secured at the forward end, where it enters into the head of the radiator, to which it is riveted and brazed. A ventilator fan is not employed on the French models, but will be fitted where the car is intended for service in hot climates. Provision has been made for mounting it.

Splash is relied on entirely for lubricating the motor, the oil being carried from a dashboard lubricator to the rear bearing of the crankshaft, from which point it falls into the crankchamber. Both gasoline and oil tanks are carried on the dashboard, the former being in front and the latter just behind it. The arrangement reduces piping to a minimum.

Chassis features of the four-cylinder model are identical with those of the single. Suspension in front is by means of a transverse inverted semi-elliptic spring, mounted above a special type of front axle. A single plate clutch is employed, and the drive is taken direct from this point to the rear axle without passing through a gearbox. There are three forward speeds and reverse, all but the reverse giving direct drive through spur, instead of bevel gears. Rear suspension is of the three-quarter elliptic type. Fitted with a two-seated body a speed of over 50 miles an hour is guaranteed with this small car.

# LATEST WEARING APPAREL FOR WOMEN AUTOMOBILISTS

THE illustrations offered in this article will afford an excellent idea of some of the leading styles of millinery and motoring coats, which are available for the season just entered. They represent a greater measure of stability, without detracting from smartness, than has ruled heretofore, and the earlier criticism, which had for its basis the fact that service was secondary to ultra fashion, does not now hold. The motoring costumes for this year will more nearly accord with the basis for true art, because excellence of appearance will not be at the expense of utility.

### SMART MOTOR COAT AND BLERIOT TURBAN FROM RENARD

The influence of Rostand's play, "Chantecler," has so pervaded spring styles that even fabrics derive their names from features of the barnyard drama. "Rooster track," is the name given to this peculiar check pattern as depicted in Fig. 2, and it is used for some of the smartest of the new motor coats. This garment has particularly graceful lines, fitting the figure more closely than motor wraps of preceding seasons, yet having roomy armholes which make the coat most comfortable. There is a touch of bright color—also a direct result of the Chantecler influence—in the leather tabs which decorate the coat. These red tabs, with their brass eyelets are placed on lapels and cuffs; and form an odd belt arrangement at front and back of the coat. This notion of belting the garment at the front, leaving the sides in long lines, is a novel one and gives a trim look to a portion of the coat which often hangs ungracefully.

The turban is an eminently comfortable model for use under a motor veil. The drapery of very soft horsehair straw may be drawn down entirely over the hair at the back, and the turban is smartly trimmed with a metal ornament and a "bleriot" or shaving brush standing stiffly erect.

Fig. 1—Comfortable coat for wet weather wear

### A PRACTICAL COAT

Secure against the most persistent onslaughts of rain and wind will be the maid enveloped in one of these cosy mackintoshes as presented in Fig. 1, which are big enough to fit easily over another coat beneath, and so cleverly cut that the effect is graceful and pleasing, and not in the least bulky. The gathered hood which may be turned up over hair and hat is an especially satisfactory feature, and when the hood is dropped on the shoulders a very trim, buttoned-up collar is revealed at the top of the coat, which fastens, as wet weather garments should, snugly up to the neck.

This garment, which comes from the New York Mackintosh Co., is of blue rainproof material with trimmings in the shape of black satin bands on the cuffs and covered black satin buttons. The seamless shoulder, and sleeve cut in one with the body of the coat give great freedom to the arms and make it possible to slip the mackintosh over even a wool wrap without discomfort. The pleats set in at the side under a simulated pocket flap, add jauntiness and grace to the coat, and the full hood in Red Ridinghood style has a youthful suggestion that is rather attractive.

## NOTES ON FEMININE MOTORING APPAREL

PARIS, March 14—There is no article of clothing in greater demand or of more service and comfort to the feminine contingent of automobilists than the knitted sweater, which may be worn under the loose coats when extra warmth is required. Many variations of the loose coat sweater are to be had. There are the full-length garment and many of shorter lengths, but the one best liked is that of the knee length. There are those of the single-breasted order, with the neck cut in a deep V; the double-breasted with a high, close collar, and those which fasten on the left side. White still heads the list, but there are many pretty models in dark blues, greens, grays, browns and new reds.

When it comes to headgear the motorist can satisfy her liking for hat, bonnet or hood. There are small hats of toque and mushroom shape, while the turbans offer no resistance to the wind, and these shapes lend themselves admirably to the draping possibilities of the veil. The motor car is wholly responsible for the revival of the picturesque hood. There are practical fur and cloth hoods for cold weather, which have as trimming little animal heads or big choux of soft ribbon, and which tie under the chin with ribbon strings.

Among late novelties are leather neckties of the four-in-hand style and a motor ring to fit over the gloved finger.

Fig. 2—New long coat of rooster track fabric

# Worthy Ideas from France and Germany

## Features of the La Buire (French) Chassis

Characteristic, and at the same time thoroughly workmanlike, is the design of the La Buire cars, made by the company of the same name at Lyons, France. A notable feature is the use in the change-gear and axles of a new type of double-row ball bearing, the balls in each row alternating, so that the bearing is no thicker than a single-row bearing of the same diameter.

La Buire motors are made in four sizes: three four-cylinders, 75 by 120, 85 by 140, and 105 by 150 mm., rated at 10, 15 and 24 horsepower, respectively, and one six-cylinder, 85 by 140, rated at 18 horsepower. The four-cylinder 15-horsepower motor, which is typical of the rest, has a block cylinder casting with all valves on the left side. The exhaust manifold is separate and bolted on; it has three openings connecting with the exhaust ports, and between these is provided with deep cooling flanges. The inlet ports are led between the front and rear pairs of cylinders, connecting with a Y-shaped manifold on the right side. Two plates cover the valve stems and springs. The camshaft is driven by a Renold silent chain.

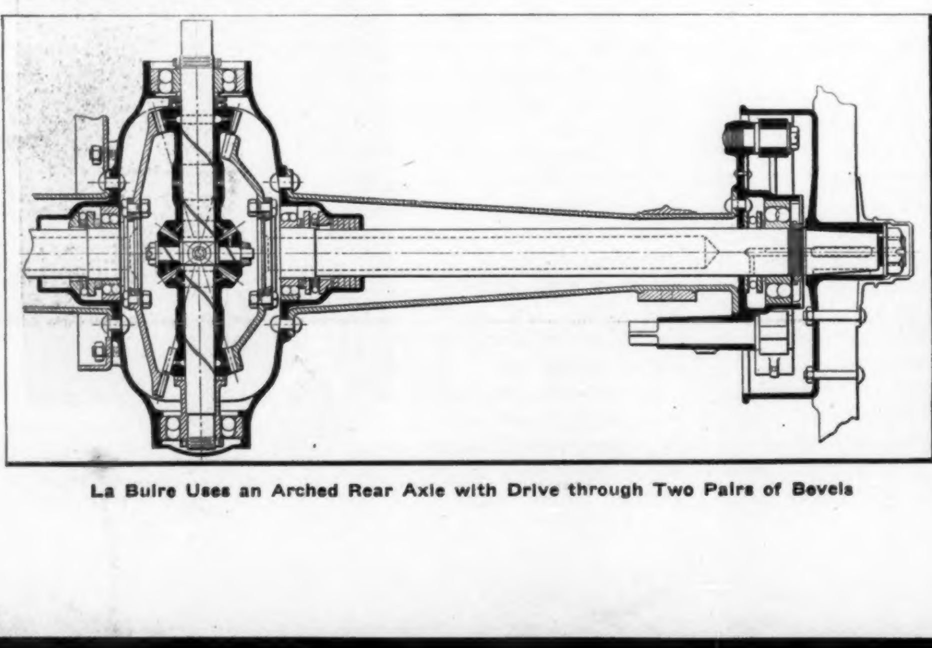
The water pump (centrifugal) and the magneto are mounted on the ends of a transverse shaft driven by skew gears on the front end of the camshaft. The water connections are made by union joints. This arrangement of the magneto brings it on the right side, with its circuit-breaker and distributor easily accessible.

Change-gear and clutch are united in the same case, the former being a four-speed selective two-throw type, and the latter a multiple-disc. The sliding-gear shaft is exceptionally long, forming at its front end a spindle which serves to line up the clutch shafts. The shaft itself has milled splines and for the sake of stiffness is made of large diameter and drilled out hollow. The constant-mesh gears have helical teeth, to secure silent operation, and since the end thrust otherwise would be considerable, are made double and reversed, forming what is known as herringbone gears. The gear case fills the whole space between the frame members, taking the place of part of the dust pan.

The rear axle is live and arched, the method of driving the inclined shafts being one which no American constructor has ever tried, although it is quite well known abroad. Each live shaft has a bevel gear on its inner end, these being of different diameters, although with the same gear ratio between themselves and their pinions. The pinion shaft extends clear through the case between them, having the pinion driving the left wheel on its front end and that driving the right wheel on its rear end. The differential is in the middle, between the two pinions.

The rear wheels are keyed directly on to the live shafts, and to secure the necessary additional strength at their outer ends these latter are made of large diameter and then drilled out from the inside ends—a repetition of the commendable, though expensive, process observed in the change-gear. The axle proper is built up of two dish-shaped pieces enclosing the bevels, and two tubular members. The latter have flanges turned at each end, and are riveted on one side to the bevel gear casing and on the other to the flange supporting the brake shoes, which also carries the outer bearings. Ball-thrust bearings are used extensively, there being no less than six of them in the axle, in addition to the six double-row ball bearings.

Drive to the rear axle is through a doubly-jointed shaft, not enclosed; a pressed-steel torsion lever is provided. The rear springs are three-quarter elliptics, or, optionally, full elliptics of the scroll type. The front springs are the usual semi-elliptics.



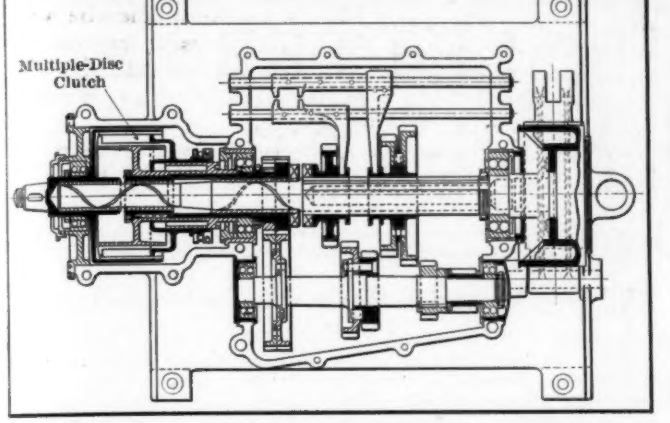
La Buire Uses an Arched Rear Axle with Drive through Two Pairs of Bevels

## The Jaugey Carbureter, a Floatless Design

With the object of providing a carbureter which will work in any position and under any conditions, M. P. Jaugey, a French engineer, has invented a new floatless design, which is the subject of a description in *La France Automobile,* March 5. A photograph of one of the carbureters mounted on the inventor's car, a Clément-Bayard, was given in The Automobile of March 10, page 515. It is now possible to show a sectional drawing of the device.

The pipe from the gasoline tank opens directly into a closed cylinder pierced with three small holes, which are opened or closed by a piston sliding in the cylinder. This cylinder lies across the body of the carbureter, directly in the path of the air passing from the air inlet to the motor; the cylinder is surrounded by a concentric cylindrical shell which acts as the throttle valve. There are three air inlets; one always open, but with a shutter which can be adjusted to provide for different weather conditions; a second mechanically operated, and a third automatic, spring-controlled. The piston which varies the gasoline feed, the throttle valve and the mechanical air inlet are all coupled together and move in unison.

Most novel is the mechanically operated air valve. It consists of eight rods of different lengths arranged around and parallel to a central stem and registering with holes in the wall of the carbureter, in such a manner that the available air opening through the various holes is increased or decreased by sliding the device out or in. The central stem projects into the carbureter and acts as a stop to limit the opening of the auxiliary valve.




Four-Speed Gear and Multiple-Disc Clutch of La Buire

When the throttle is closed to stop the engine, the piston controlling the gasoline feed comes to a firm seat, and the throttle itself closes up all opening into the cylinder, so that there can be no leakage of gasoline. At low-speed running the throttle is opened slightly, thereby uncovering the first of the three gasoline outlets and providing a sufficient opening in the mechanical air inlet. Any variation in the speed of the motor with a constant throttle position brings the auxiliary air valve into action. At higher speeds the throttle is opened progressively, uncovering the second and finally the third of the gasoline outlets, with a corresponding area of air inlet.

This carbureter can be attached to the car in any position without impairing its functionment. On his demonstrating car M. Jaugey had it fastened to the side of the driver's seat, in the position usually occupied by the horn, and connected with the motor by some five feet of flexible tubing. It does not need to be heated, and will work under a film of ice, provided it has a free air inlet.

## Drive Through Belt and Variable Pulleys

The Fouillaron system of belt drive is quite well known in Europe, having been in use there for a number of years with good success. So far as is known, though, the only time it has appeared in this country was at the St. Louis World's Fair, at which Fouillaron had an exhibit.

The motor shaft and the drive shaft run parallel to each other, and bear similar extensible pulleys. These pulleys have two cone-shaped members of pressed steel, slotted in such manner that they telescope into each other. The telescoping action varies the effective diameter of the pulley. By an ingenious system of lever connections the two pulleys, one on each shaft, are connected so that as one moves together to increase the diameter, the other spreads apart to decrease its diameter, so that the length of the belt need not vary.

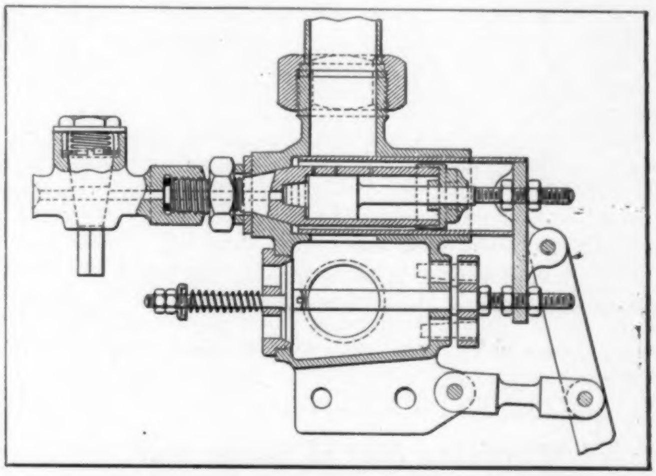
The belt itself is a special construction of raw-hide, triangular in section, and very efficient as a power transmitter. The device yields a wide range of speed ratios, not so complete perhaps as that of the friction-wheel devices, but still wider than that of any standard type of change-gear.

The drawing given herewith, reproduced from *Der Motorwagen*, shows the application of this transmission to a comparatively high-powered four-cylinder car. In order to allow an ample distance between the centers of the shafts, these have been set at an angle, the motor lying diagonally in the car. There seems to be no objection to this arrangement, strange though it looks, except that the motor might be difficult to crank. In the drawing the car is shown on its highest gear ratio, the drive shaft turning at about three times the speed of the motor shaft; this of course necessitates a big reduction in the bevel gears on the axle. For the lowest ratio the arrangement is reversed, and the drive shaft turns at one-third motor speed.

## Miesse Horizontal Air-Cooled Aero Motor

This motor, the product of a prominent Belgian firm located at Brussels, was illustrated in THE AUTOMOBILE, issue of March 3, although it was not possible to secure a description of it at that time. It is distinguished by the horizontal position of its cylinders, which are four in number, opposed in pairs; by its system of air-cooling, and by its concentric valves actuated by a single cam.

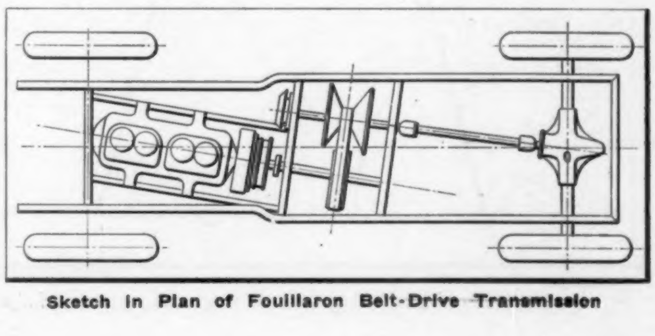
Cylinders are 120 mm. bore by 160 mm. stroke, and the motor is claimed to develop 60 horsepower at 1,200 r.p.m.; the weight



Jaugey Floatless Carbureter, Attached in Any Position

is given as 90 kg. (198 lbs.). The crankshaft is of the two-throw type. The air-cooling feature will be familiar to American readers, at least in principle; it differs from any present examples, however, in using a separate centrifugal blower for each cylinder. The four blowers are located on top of the crankcase in pairs, each pair on a shaft driven by spur gears from the camshaft, and connected with its cylinder by a separate pipe. The cylinders are provided with longitudinal cooling fins and a sheet-metal jacket; the air enters at the top, around the valve seats.

The concentric valves are so arranged that the inlet is the outer one and the exhaust the inner. The arrangement by which they are operated from a single cam is particularly ingenious. The inlet valve, of a cylindrical shape with the exhaust passage through its center, has no apparent connection with the actuating mechanism. There are really two exhaust valves, on the same stem, arranged so that when the lower one closes the lower end of the inlet valve sleeve, the upper one leaves the upper end wide open, and vice versa, or both can be half way open at the same time, thus leaving a through passage. During the compression and explosion strokes the lower exhaust valve is seated. During the exhaust stroke the valves are in the half-way position. At the end of the exhaust stroke the valve stem moves still further down, bringing the lower valve wide open but closing the upper one, and so shutting off the passage. Upon a further downward movement the upper exhaust valve, bearing down on its seat on the inlet valve shell, forces the latter open, and so the cycle is completed.



Sketch in Plan of Fouillaron Belt-Drive Transmission

## Hydraulic Transmission Details

Editor THE AUTOMOBILE:

[2,206]—Having read in a recent issue of an hydraulic motor gear, I am very anxious to get more details, and also some statement as to its future possibilities. I would therefore appreciate seeing something on this subject under letters.

Boston. HAROLD W. PIERCE.

There are, broadly speaking, two hydraulic transmissions now on the market in an operating form, one English, the Torbina, the other American, the Manly. The former was described in THE AUTOMOBILE of March 3, page 467, while the latter was described in two separate issues for Dec. 10, 1908, and Feb. 4, 1909, page 243.

The latter has just been adopted by the American-La France Company for use on all of the commercial and fire service motor wagons made by them.

As to the possibilities, one can only estimate, in which one man's unfavorable opinion is as good as another's favorable one: The advantages claimed are elimination of the clutch and transmission, as well as the operating means for both. Moreover, the ordinary transmission permits but three or at most four speeds, all others being secured by a variation in the running of the engine. With the hydraulic transmission, on the other hand, an infinite number of speeds may be obtained, allowing the engine to be run at a constant speed, at which it is more efficient.

## Purifying Still of Large Size

Editor THE AUTOMOBILE:

[2,207]—I am much interested in the subject of water purification, in particular for use in automobile cooling systems, and want to ask you something about it. Would it cost much to build or have made a fairly large distilling apparatus in order to purify and soften your own water? I was much interested in the letter on this subject in last week's issue of "The Automobile," but want a large sized one so not to be bothering all the time.

Albany, N. Y. CARL COYLE.

Below is shown a sketch of a large sized still, as promised last week, which can be made, that is, the metal parts, by any tinsmith. The boiler, if it may be so called, is of any sheet metal, providing it has a heavy bottom to stand the repeated heatings well. It has at the top a filling cap, and an outlet of gradually reduced diameter, which leads the stem up to the top of the condenser. The latter is made from a water-tight barrel, inserted in which is a coil of copper pipes. Copper is expensive, and other metals may be used, but it really is the best for the purpose. The barrel is filled with water, and if large enough, one filling will suffice for a whole season's use. The size of the still should be such as to make more than a radiator full at one operation.

# LETTERS INTERESTING

## All Dry Batteries Have the Same Voltage

Editor THE AUTOMOBILE:

[2,208]—Would you be so kind as to give me an explanation of the difference in voltage between No. 6 dry cells and No. 8 dry cells? The ignition on my motor was produced by six No. 6 dry cells (20 amperes), but on account of short duration of same I am now using four No. 8 dry cells (30 amperes). Will the change in the battery affect the coil or cause any damage to the spark plugs? C. L.

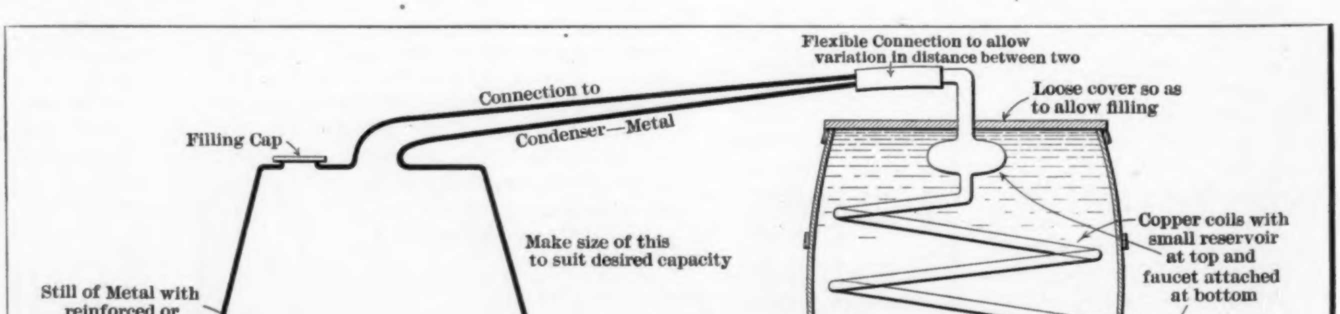
La Crescent, Minn.

The size or number does not make any difference in the voltage of the dry cells. In any sort of battery which produces electricity by chemical action, there is a certain definite difference in potential or voltage between the materials used, regardless of the quantity of the materials.

Dry cells for automobile ignition are commonly wired in series, an arrangement by which the difference in potential of each cell is multiplied by the number of cells. A dry cell, of any size, gives from 1 1-4 to 1 1-2 volts when new, so that with your first set of six cells in series you were getting a total of about 8 volts, and with the present set of four you get 5 to 6 volts. The amperage of the battery, with this wiring, is the same as that of a single cell.

The reason your first batteries did not last long enough was that the amperage was not sufficient. Amperage measures the quantity of the electric current, just as you measure gasoline by gallons. On the same car a 30-ampere battery will last half again as long as a 20-ampere one. Voltage measures the pressure or strength of the current, and 6 volts is about right for automobile work.

No change in the batteries or the current supplied by them will effect the coil in any way, that is, in any detrimental way, all coils being constructed for heavier loads than they are ever called upon to carry. Aside from the coil, which has just been explained, there is no other trouble which may be caused in the ignition circuit, unless it be in the wiring, which may have a very scanty insulation, the latter being so scant as to break down under higher voltages and thus give trouble.




Sketch Showing Component Parts of Large-Sized Still for Purifying Water to Use in Automobile Cooling Systems

# ANSWERED AND DISCUSSED

## How to Become a Chauffeur

Editor THE AUTOMOBILE:

[2,209]—Will you kindly give me some information on the following matters? I wish to become a competent automobile mechanic and chauffeur, able to drive and repair any make of car, also to handle and repair marine engines. I have not the slightest knowledge at present of that kind of work. How can I most quickly learn this trade, having due regard for thoroughness of training? What wages do men of this class earn usually in the United States? A. D. MACK.

Inlet Baddeck, Nova Scotia.

There are two ways to go about this matter, both of which have some advantages and also some disadvantages. Thus, you can start in with some good automobile school, take a thorough course, then take a place driving a car, being careful to select such a place as will not offer too much difficulty. Beyond that, you will learn much and improve as you go along. This has the double disadvantage of being both slow and not very thorough, moreover, it presupposes a knowledge of mechanical work.

The other method is to go into some factory, and gradually work around from one department to another, staying long enough to learn the part of the work done there thoroughly. When you feel that you have learned all about the making and assembling of the car, then try to get into testing and demonstrating work, which leads naturally to driving. This process, while attended by some large difficulties, is by far the best, and will give better results than any other way. Moreover, factory men are more in demand than school men, and usually get higher wages. The disadvantages are that the factory heads oppose the shifting around so that this process means changing from one factory to another. Moreover, this process is necessarily a long one, covering several years. It has the big advantages of being very thorough, and of bringing in an income while learning, also, as spoken of before, this class of men get more money.

It is very difficult to give you any correct idea of the wages paid, as they vary with the individuals and situations to such a large extent. Some country places, expect to get a good man for $40 a month, with board and rooms. Some city places on the other hand, offer as high as $50 per week for men of the highest skill. As a fair average $25 might be said to cover the large city position, and slightly less the smaller city, and about half that figure for the country. It is said that washers in New York City receive $20 per week, and brass polishers, $13.

## Correct Pronunciation for the Autoist

Editor THE AUTOMOBILE:

[2,210]—Will you please give in "Letters Interesting, Answered and Discussed" the correct pronunciation of the following words: chauffeur, chassis, garage? HERRON & SON.

Boyne City, Mich.

As these words have not yet been recognized by the dictionaries, the really correct pronunciation is that of the French, from which they originated. Most automobilists, however, have adopted a half-way pronunciation, about as follows: chauffeur is pronounced "sho-fer," usually accenting the first syllable, but sometimes the second—the latter is regarded as more elegant; chassis is "shass-iss," accenting the first syllable, and garage is "ga-razh" ("zh" like "s" in pleasure), with accent on the last syllable.

## Large Wheels Have Many Advantages

Editor THE AUTOMOBILE:

[2,211]—Please give me some information as to what advantage a 36-inch wheel has over a 34-inch, if any. READER.

Malone, N. Y.

Large wheels have in general two advantages; they are easier riding and less expensive on tires. Their easy riding is due to the fact that they do not drop so far into holes, and do not rise so sharply over rocks and humps. A large wheel will bridge across a hole that a smaller one would drop into bodily; and in the same way, being less sharply curved than a small wheel, it meets an obstruction in the road sooner and easier.

In the second place, a large wheel turns fewer times than a small one in traveling the same distance. A 34-inch wheel turns 593 times in one mile, whereas a 36-in one turns 560 times. This, together with the facts above mentioned, makes it less wearing on tires, so that, although the first cost of a 36-inch tire is greater than that of a 34-inch, the large tire will last more than enough longer to make up the difference.

## Garage Drainage Problems

Editor THE AUTOMOBILE:

[2,212]—I will appreciate very much any reference you can suggest to assist in gaining information on what is being done in the best practice in the matter of protecting garages from accumulations of explosive vapors in their drainage systems.

Philadelphia. J. HOGELSON.

This is a very important problem and one which the various municipalities have done very little with. The reason why there is so little literature on the subject is concealed within this statement. However, THE AUTOMOBILE has several times published something on the subject, the latest being found in the Dec. 23 issue, on pages 1084 and 1085, the subject of the article being The Private Garage Problem, and the specific matter dealing with the drainage systems required in Milwaukee, and some other municipalities. New York City has a specific law dealing with this subject, copies of which can be obtained.

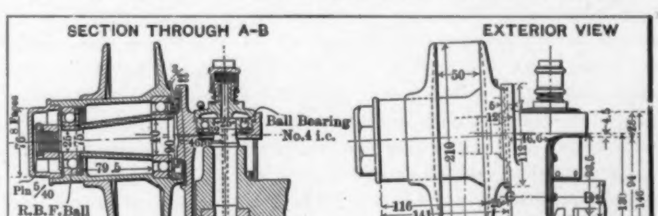
## Latest Type Lemoine Axle

Editor THE AUTOMOBILE:

[2,213]—In "The Automobile" which came to hand recently we find that the information you give one of your correspondents in regard to the Lemoine type of axle is incorrect, both as regards the illustration and the description. The type of axle you illustrate was made by Lemoine many years ago before the automobile was the perfected machine it is to-day. This axle is not manufactured at the present time nor has it been for several years. The type of axle known specifically as the "Lemoine type" is that shown in the illustrations enclosed. We will ask you to publish these illustrations in order to correct the erroneous information which your reply conveys. The blue prints we are sending herewith give a very good idea of the Lemoine type of knuckle which can be entirely enclosed to exclude grit and dirt. It is this type of axle for which the Etablissements Lemoine control the patents.

INTERNATIONAL ENGINEERING CO.,

New York City. American Agents; Etablissements Lemoine.




Drawings Showing Proportions of Latest Lemoine Axle

# THE LEGISLATIVE SITUATION IN NEW YORK

By XENOPHON P. HUDDY, LL.B.

THE State of New York will have a new automobile law in all probability before the present session of the legislature adjourns. The existing law was passed in 1904 and has remained on the statute books practically unchanged up to the present time. It has served as a model and foundation for motor vehicle enactments in many other States, improved upon, however, in other jurisdictions in many respects. On the whole, the 1904 law has worked fairly well, but the development of conditions arising out of the operation of motor vehicles on the public highways and certain defects in the 1904 law have brought about an urgent need for a new enactment in this State covering the subject. Last year both of the houses of the legislature passed a motor vehicle law which contained no limit on speed except that of reasonable and proper driving. This feature of the bill governing speed was believed to be objectionable and therefore was vetoed by the Governor.

No attempt this year is seriously made on the part of automobilists to have enacted such a broad speed provision. Those who have the best interests of the automobile industry at heart and also the safety of the public, believe that a general speed limitation of this nature would be inadvisable at this time, however many good arguments can be presented in favor of it.

It is very generally conceded that the State of New York needs a new law, but the old law is a great deal better than many bills which have been introduced into the legislature this session. If a better law cannot be passed this year it would be much wiser to allow the old one to remain. In fact, many arguments can logically be advanced in favor of no new legislation. It is always considered an advantage to be working under a known law which has been in existence for several years, inasmuch as everybody is familiar with its provisions and it is not like new legislation which may be discovered to be invalid on account of some mistake. In other words the old law has been tried out and found to be valid. On the other hand, the 1904 law contains many defects, such as, for example, it permits any person to obtain a driver's license, even though he may be blind or a cripple or of immature age. Also the registration and licensing fees are small as compared with those in other States.

It is very generally agreed among automobilists that a reasonable license fee should be paid for the privilege of operating motor vehicles on the public highways, and this license should be renewed annually. In the State of New York to-day $2 is paid for a license and no renewal is required. There is hardly any other State in the Union where automobile travel exists to any extent with so small registration fees, but the objection by automobilists to paying a tax may reasonably and justly be made. There is a vast difference between a license fee and a tax. A license fee is imposed under the police authority of the State which constitutes the power to enact regulations to protect the safety and general welfare of the public. It has nothing to do with the taxing power. The State may do many things under the police power, but just as soon as it attempts to regulate conduct with a view to protecting the public safety by taxation, it is exceeding its constitutional authority. So it should be a principal to be adhered to by all automobilists that the automobilist cannot be taxed for the privilege of using the public highways. Make the license fee fair and reasonable so that the State may receive a fair amount of revenue therefrom, but do not make the fee so large that it will constitute an exercise of the power of taxation, which power is the power to destroy, as was long ago announced by the Supreme Court of the United States, in the case of the United States vs. Bank of Maryland.

The main features of a proper automobile law are: to provide a method of identifying offenders, to regulate speed and the operation of automobiles with a view to the safety of the public and to procure revenue. Originally revenue was not considered an essential feature of automobile legislation. Now it is looked upon as one of the main objects. No objection can be made on the part of automobilists to contributing a certain reasonable amount of revenue which is to be applied for the construction and maintenance of roads. That automobiles more or less wear out highways is conceded. Automobilists desire good roads which save their machines and make their tire expenses less. For these reasons automobile users are willing that the registration fees in the State of New York be increased and be made payable annually, but the amount of the fees must not be so great as to make the license charges, taxes.

In regard to the speed of automobiles, this presents a question which is surrounded with more difficulties than any other feature of motor vehicle legislation. Some desire practically no speed limits. Others want very small arbitrary limitations. Then again there are those who believe that we should have a *prima facie* provision, similar to that which exists in the States of Massachusetts and Connecticut. Of course, we cannot have all these and it is merely a question of choosing which is the best. There is very much to be said in favor of incorporating the *prima facie* limitation clause in a speed regulation. For example, if the law provides that 25 or 30 miles an hour shall not be exceeded in the country districts and if a person exceeds this limit it shall be evidence of dangerous driving or a violation of the law. Such a provision would permit the defendant to prove as a matter of fact that no danger was created. In other words, if this provision is inserted, many technical violations of the law would be done away with and undue hardship and oppression would be eliminated. It is very generally conceded by the authorities that automobilists should not be arrested if they exceed the speed limit of 10 miles an hour by a few fractions of a minute. Several of the bills introduced at Albany have raised the speed limit of 10 miles an hour to 15 miles an hour in the built-up sections of cities. This is a wise change, for it has been demonstrated in New York City, for example, that it is practically impossible to comply with the 10-mile rate and that all vehicles exceed this limit. Fifteen miles an hour is a more just rate. In the sections not built up 20 miles per hour can safely be allowed. In the country districts 30 miles an hour is not excessive. Of course, under no circumstances should an automobile be driven at a dangerous rate of speed considering the conditions.

Coming to the question of chauffeurs, we find that a condition of affairs exists which is not at all easy to deal with. Many accidents have been caused by chauffeurs. So also have owners been the cause of collisions and injuries. Whether there should be any distinction between chauffeurs and owners as to licenses to drive is disputable. It is regarded by some that the chauffeur is engaged in a special occupation and for that reason alone he is placed in a separate class and should be subject to regulations different from those who do not make a business of driving for hire. There is much good sense and logic in this argument. On the other hand, it is said that the owner who drives his car can do just as much damage as the chauffeur, and the owner should possess the same qualifications and the same kind of a license as required of a chauffeur.

Whether an examination of automobile drivers would have a tendency to eliminate the reckless operation of motor vehicles and would protect the public better seems to be another question concerning which there is much to be said. Of course, wrongful conduct can never be legislated out of existence. It would seem that an examination might call for physical soundness of a driver and a certain amount of knowledge concerning the safe condition of the machine which he is operating. Beyond

these it is somewhat doubtful whether an examination would be of any value. A license to drive, however, should be subject to suspension and revocation for causes not technical. This is very generally conceded.

In regard to penalties, no objection can be made to making them severe for violations which are not purely technical. In the method of arrest and prosecuting automobilists, however, as much red tape as possible should be eliminated. Under the present law in New York an automobilist is arrested, then taken before a police captain where bail must be given, then taken before a police magistrate where a hearing is had, and then bail is given again, then he is bound over to the Court of Special Sessions where he must go to plead and then go again to this court for his trial, where he is often compelled to wait all day until his case is called. After the trial he may depart upon paying his fine if convicted. This process is entirely and altogether too lengthy and annoying. It clogs the courts with unnecessary business, takes the time of policemen and court attendants which might be devoted to more serious and important matters and on the whole it is highly objectionable. It would be very much better to allow the magistrates to dispose of automobile cases forthwith. This view is shared by many judges.

In the enactment of a new automobile law for the State of New York many factions are to be taken into consideration. We have the owners of automobiles, taxicab proprietors, manufacturers and dealers, garage keepers, tire manufacturers and chauffeurs. They are all vitally concerned. Each class has its own ideas about the proper kind of legislation and no two are exactly the same, so whatever law is enacted will be the subject of a compromise to a certain extent. One thing is to be remembered, however, that there does not exist to-day the prejudice against automobiles which former legislators had to contend with, and it is quite likely that when the New York State Legislature has finished its work this session on automobile legislation a very good law will be enacted.

# SURPRISING RESULTS FROM NEW TWO-CYCLE ENGINE

RESULTS which will surprise many have been obtained with a new form of two-cycle engine, shown and described at the recent meeting of the A. C. A. at the club house on Fifty-fourth street, New York City. That this subject possesses much of live, human interest was clearly shown in the attendance, which far surpassed any previous attendance for this year's meetings. Not alone were there many in attendance, but they were interested to the extent of digging down into the details, as well as wanting an explanation of the theory. After a brief mention of the latter, J. H. Freeman, who described the engine for the inventor, Mr. Newcomb, told of the advantages to be derived from its successful operation.

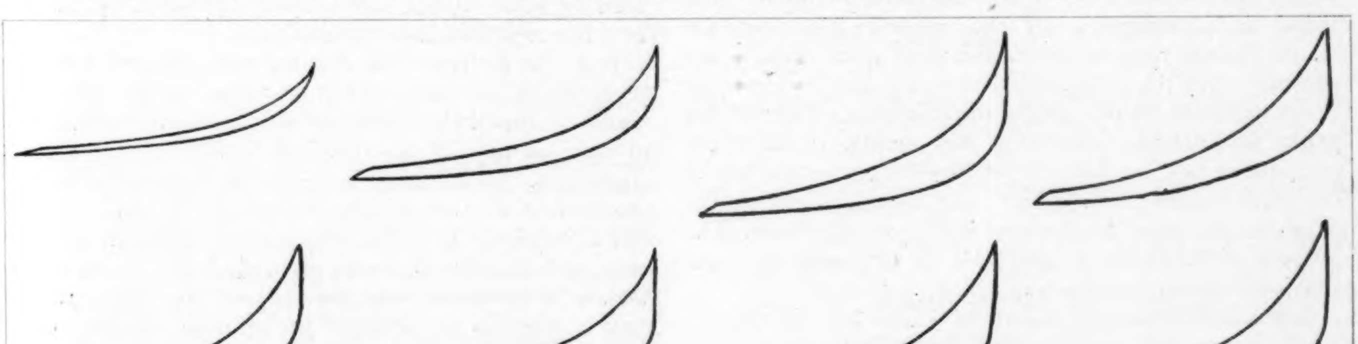
This talk was followed by a test, in which the engine, after refusing to start, behaved very well, and showed up in excellent shape. The ordinary form of two-cycle, three-port arrangement is used, but the fuel is injected, preferably from above, by means of a small pump. The latter is driven off of what corresponds to a camshaft on the ordinary four-cycle engine. This may be varied as to height of lift, and also time of lifting, so that the fuel injection may be varied within wide limits. Appended is a test and the results of the same:

**NEWCOMB TWO-CYCLE ENGINE**

**Tests Made at Columbia University**

| No. | Speed. | M.E.P. | B.H.P. | I.H.P. | Air Per Hour. | Fuel Per Hour. | Fuel Per B.H.P. Hour. | Fuel Per I.H.P. Hour. | Mech Eff. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 470 | 37.3 | 4. | 5.8 | 147. | 3.46 | .87 | .59 | .69 |
| 2 | 470 | 42. | 5.2 | 6.5 | 146.2 | 3.75 | .72 | .575 | .80 |
| 3 | 470 | 52.4 | 6.8 | 8.1 | 147.7 | 4.22 | .62 | .52 | .84 |
| 5 | 475 | 77.5 | 9.3 | 12.1 | 148. | 7.05 | .75 | .58 | .77 |
| 7 | 600 | 27.2 | 3.18 | 5.4 | 156. | 3.25 | 1. | .6 | .59 |
| 8 | 620 | 35. | 4.2 | 7.15 | 163.8 | 3.6 | .86 | .505 | .59 |
| 10 | 600 | 36.8 | 5.6 | 7.3 | 162.8 | 3.7 | .66 | .505 | .77 |
| 11 | 620 | 40. | 6.7 | 8.2 | 162. | 4.05 | .6 | .495 | .82 |
| 13 | 620 | 51. | 8.55 | 10.4 | 161.4 | 4.68 | .545 | .45 | .83 |
| 14 | 560 | 62.8 | 8.6 | 11.6 | ... | 5.54 | .65 | .475 | .74 |
| 16 | 600 | 74. | 10.5 | 14.5 | 158. | 8.35 | .79 | .575 | .73 |

Single cylinder 5 1-2 by 5 1-2 inches (effective piston stroke 4 3-4 inches), ratio of compression about 1 to 5.



Various Manograph Curves from Newcomb Two-Cycle Fuel-Injection Engine, Arranged in Order of Increasing Power

THE AUTOMOBILE

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Contests will soon be the most conspicuous of autoing events, and much interest will be taken in them. The rules, as promulgated by the Contest Board of the A. A. A., are now in force, and they were revised, apparently with the expectation of being able to eliminate the faults as developed during the past year. The autoing public will readily understand that strictly racing types of automobiles are built out of special materials, under the most exacting conditions, and from designs gotten out by engineers of accentuated skill and experience. The interest of the public in this class of automobiles is passive, and from a sportsman's point of view.

Reliability contests, known as Class "A" in the A. A. A. rules, and other events, which are supposed to bring out the capabilities of "stock cars," interest the autoing public on an entirely different basis. These events are supposed to test the capabilities of the cars, and are claimed by the contestants to represent the way by which purchasers will be enabled to observe performance, and thereby have the means at hand for the purpose of separating the sheep from the goats.

It is to be hoped that the rules as they are now in force, will make it impossible for any unfair contestant to use special racing magnetos on so-called "stock cars," or other devices which will increase speed and endurance beyond that which may obtain in the regular stock cars of the same make. The only fair way of trying out stock cars is to use them as they are regularly put out, and to forbid the use of special magnetos, ball-bearings, carbureters, tires, materials in general, and methods. The mere fact that two cars look alike, come out of the same plant, and in general are made from the same drawings, does not make them alike. Purchasers of automobiles, if they are inveigled into the belief that a car as it enters a stock contest is a stock car, if it is not, will ultimately look upon every contest as the device of the unscrupulous, and the honest makers of real automobiles will be made to suffer accordingly.

It is not enough to dismiss this subject when it is brought to the attention of the proper board, with a wave of the hand, and a statement that the rules had been complied with. An unscrupulous act is rendered none the less so if it is done by rule, and in the long run makers of real automobiles will be compelled, by force of public opinion, to exclude the class of men who enter a special car which is not on a par with their regular automobiles.

♣ ♣ ♣

At the last annual meeting of the Society of Automobile Engineers it was pointed out by President H. E. Coffin, in his inaugural address, that motor building, as a science, is in the primary grade. Glancing over the industry, and examining critically beneath the surface, seems to bear out President Coffin's contention. There is undoubtedly a considerable amount of activity in the various laboratories in the several plants, much of which is directed against the motors of to-day, with the hope, perchance, that the motors of to-morrow will be better.

The poppet valve of motor has probably reached the maximum of its capability, and tests have shown that it will utilize 20 per cent of the terminal value of the fuel in useful work, and that 80 per cent is lost, either in the exhaust, the water-jacket, noise, or molecular work. This seems to be a poor showing, but the average steam engine delivers about 8 per cent of the thermal value of the fuel used, and the finest engines of this generic type used on ocean liners will scarcely approach 17 per cent as a figure of the thermal efficiency.

Just now the two-cycle fuel-injection motor is receiving its quota of attention, and it promises much. The latest idea is to inject the fuel after the ports are covered, and to vary the time of the fuel injection to suit the running conditions. In this way, it is possible to alter the ratio of the fuel to air, hence vary the power to suit the needs and to employ a very high compression without having to cope with the ills of pre-ignition, since the timing of the fuel, as it is injected into the body of air in the cylinder, may be such as to eliminate pre-ignition trouble.

Earlier designs of two-cycle motors invariably delivered less than they promised theoretically, because a homogeneous mixture was made in the crankbox and was transferred to the cylinders under conditions of bad scavenging. Within the last two or three years attention has been paid to the mechanical arrangements which have to do with scavenging and the performance of two-cycle motors improved wonderfully as a result. It is now claimed that the direct injection of fuel, in addition to the other improvements wrought, will increase the thermal efficiency of automobile types of motors to a material extent. As a further effort in the direction of improvement, one school of engineers is working on two-cycle types of motors, using forms of slide or piston valves, the idea being to afford a more commodious exit for the burned gas, and to time the valve action to suit the specific conditions.

# N. Y. Automobile Trade Association Banquet

THE New York Automobile Trade Association gave its annual dinner in the rooms of the Automobile Club of America on Wednesday evening, March 3d. M. Haradon, president of the Association, presided as its toastmaster, and after an elaborate menu, in introducing the speakers, announced that the Association consists at present of sixty-seven firms doing business in the automobile trade in the City of New York, and that the objects of the organization are co-operative tending to uniform garage rates and regulations, and a uniformity in prices. He introduced as the first speaker Mr. Whiteside, assistant District-Attorney, who gave some careful advice to the law breakers, and was followed by Col. Edward Cornell, chairman of the Highways Protective Society, who explained the mission of the Society in its work for good roads, careful driving and proper use of public thoroughfares by all classes of vehicles. He ascribed a majority of the accidents happening to automobilists as due to intoxicants, and in this particular pointed out that the owner is a more dangerous man than the professional chauffeur. Next followed Oliver A. Quayle, Chairman of the Legislative Committee of the New York State Automobile Association, who explained the situation at Albany, and stated that the only two prominent bills before the Legislature both restrict the passage of speed trap regulations by local authorities, and allows the automobilist fifteen miles an hour in cities and villages, with a maximum of thirty miles in the open highways. Quoting statistics of accidents, he found in the City of New York in one year 180 deaths caused by automobiles, 246 by horse-drawn vehicles, 240 persons killed by trolleys. Outside of the City of New York 15 persons were killed by automobiles, 26 by horse-drawn vehicles and 12 by trolleys. The editor of "The Schoolmaster," Creswell MacLaughlin, confined himself to drastic remarks on general political economy and the solemnity of the occasion of which he was a participant. After which John C. Wetmore, introduced as the "Dean of the automobile writers," closed in his usual happy manner. The dinner was well attended and a live interest was shown in general conditions.

# Ohio Clubs May Withdraw From A. A. A.

COLUMBUS, O., March 28—An amendment to the constitution and by-laws of the Ohio State Automobile Association, permitting that organization to withdraw from the A. A. A., was adopted at the annual meeting of that organization in this city. During the year there was a gain of 400 members.

The report of the secretary, Dr. A. B. Heyl, of Cincinnati, showed the membership in good standing to be 1,773.

The board of directors elected consists of W. F. Bonnell, Harry L. Vail, Fred T. Sholes, Walter C. Baker, W. H. Wherry, Lyman Lawrence, T. M. Cagwin, George Collister, F. J. Baird, C. J. Forbes, Jr., and Paul T. Lawrence, of Cleveland; C. L. Bonnifield, G. W. Drach, L. J. Merkle, G. W. Cleveland, A. B. Heyl, McKim Cooke, L. S. Colter, Charles Ireland, A. P. Streitman, William Perin and Carl Streit, of Cincinnati; Perin B. Monypeny, C. Roy Clough, Nelson J. Ruggles, Herman Hoster, C. E. Firestone and William M. Frisbie, of Columbus; Harold Sprigg and Philip H. Worman, Dayton; G. E. Mentel, Springfield; W. R. Huntington, Elyria, and James A. Allen, Kenton. Directors from other cities will be elected later.

Harry L. Vail, of Cleveland, was re-elected president; Dr. A. B. Heyl, of Cincinnati, secretary, and L. S. Colter, Cincinnati, treasurer. Perin B. Monypeny, of Columbus, was elected first vice-president; James A. Allen, of Kenton, second vice-president, and Cyrus E. Mead, of Dayton, third vice-president.

# Coming Events in the Automobiling World

Mar. 26-Apr. 2...Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.
Mar. 26-Apr. 2...Montreal, Automobile and Motor Boat Show, Official Motor and Sportsmen's Show Committee of the Automobile and Aero Club of Canada, in the Coliseum. E. M. Wilcox, Manager, 123 Bay St., Toronto.
Apr. 6-9..........Watertown, N. Y., Automobile Show, Watertown Automobile Dealers' and Manufacturers' Association, in the State Armory.
Apr. 9-16.........Elmira, N. Y., State Armory, Automobile Show, Elmira Chamber of Commerce.
Apr. 11-16........Harrisburg, Pa., Kelker Bldg., Automobile and Sportsman's Show, Harrisburg Automobile Dealers' Association. B. R. Johnson, Manager.
Apr. 11-16........Erie, Pa., Meyer Block, Automobile and Motorcycle Show.
Apr. 23-29........Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.
Jan. 7-14, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 17-24, 1911..New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Feb. 13-25, 1911..Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

## Races, Hill-Climbs, Etc.

Apr. 6-9..........Memphis, Tenn., National Aviation Meet, Aero Club of Memphis (member Aero C. A.).
Apr. 8-10 & 13-17.Los Angeles, Cal., Inaugural Meet, Motordrome.
Apr. 30-May 2...Philadelphia, Roadability Run to Atlantic City, Quaker City Motor Club.
May 2............Flag to Flag Endurance Contest, Denver, Col., to City of Mexico.
May 5-7..........Atlanta, Ga., Track Races. Atlanta Automobile Association.
June 11..........Wilkesbarre, Pa., Annual Hill Climb Up Giants' Despair, Wilkesbarre Automobile Club.

## Foreign Shows and Races

Mar. 19-Apr. 3...Berlin Automobile Show.
Mar. 22..........Elegance Competition at Monte Carlo.
Mar. 27-Apr. 4...Prague, Austria-Hungary, Automobile Show.
Mar. 28..........Brooklands, England, Easter Meeting.
Mar. 31-Apr. 8...French Spring Wheel Competition.
Apr. 2-24........Turin, Italy, Automobile Show.
Apr. 27-28........Brooklands, England, Two-Day Meeting.
May 1-Oct. 1......Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 28-June 9...St. Petersburg, Russia, Automobile Exhibition.
June 2-8.........Prince Henry (German) Touring Competition.
June 13-18.......Scotland, Scottish Reliability Trials.
June 20..........French Voiturette Race.
June 21..........French Stock-Car Race.
June 22-July 5...Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27..........Speed Trials at Kiev, Russia.
July 12-18........Ostend, Belgium, Automobile Week.
July 20-25........Boulogne, France, Automobile Week.
Aug. 1-15........Ardennes, France, Meeting.
Aug. 15-Sept. 15.French Industrial Vehicle Trials.
Aug. 21..........Salon, France, One and Five Kilometer Trials.
Aug. 28..........Mont Ventoux, France, Hill Climb.

# "SECRET TIME" TO LEVEL EXPERT AND NOVICE IN RUN

THE third annual Roadability run, under the auspices of the Quaker City Motor Club, will take place Saturday, April 30. The start will be from the club rooms, Hotel Walton, Philadelphia, and the course will be by a roundabout route to Atlantic City. The run will be made according to the rules and approved supplementary regulations of the A. A. A., and with the endorsement of the Philadelphia Automobile Trade Association, in co-operation with the Board of Trade and municipal authorities of Atlantic City.

It will be open to all pleasure cars and under the plans formulated by Secretary H. C. Harbach of the Quaker City Motor Club, unusual interest is given the affair. The handicapping rules are unique, in that the winner of the first prize may finish anywhere in the procession and the first car past the finishing line may earn one of the least of the awards. This unusual condition is created by the selection of a certain definite but secret time for the run and awarding the highest prizes to the cars that most closely approximate that time. The secret time will be within the legal speed limit of the State of New Jersey and will be fixed by Mayor John E. Reyburn of Philadelphia and his confrere Mayor Franklin P. Stoy of Atlantic City.

By adopting such a plan, the club has placed a penalty upon illegal speed and has equalized the chances of the fastest cars with those of more moderate speed and power. In addition to five principal prizes which will be of sterling plate, 160 approximation prizes have also been provided.

The object of the run under the conditions is to afford a contest in which the novices and owners of private machines will be upon the same plane as the experts and professional chauffeurs.

Each car is required to carry two or more passengers. At the conclusion of the run, the cars will park on the Million-Dollar pier, where trophies will be awarded and prizes distributed.

An impromptu auto show will be held after the awards have been made. Last year seventy cars finished in the run of the Quaker City Motor Club and this year a material increase in that number is expected, as 165 prizes have been prepared.

The return trip may be made at the convenience of the contestant, as the jurisdiction of the club does not extend any further than the finish of the run.

# RUSH ENTRIES FOR LOS ANGELES MEET

LOS ANGELES, Mar. 27—The track board at Playa del Rey has been completed and a number of the drivers who are going to compete at the April meeting tried out their cars on the new saucer, during the past few days. The finishing touches were put upon the track surface, when the boards were treated with a powdery coat of crushed shell. Great speed was attained by some of the cars and the drivers are enthusiastic about the prospects for a successful meeting.

Among the entries made during the week are those of an Isotta car, by J. B. Marquis and a Reo Bird, by Bruno Siebel; three Marmon cars which will be driven by Ray Harroun; a Corbin, by Al Livingston; two Appersons by Harold Hanshue; a Cole "30" by William Endicott and a Darracq which will be driven by Ben Kerscher. In addition to the entries of De Palma, Robertson, Oldfield, Lescault, Bragg and Hearne, this list makes a formidable appearance. There are also prospects of entries of several more Fords, Buicks, a Velie, Sterling, Stearns, etc.

An interesting feature of the meeting will be the appearance of several of the speed marvels of the past, among which are old "999," the famous racer of Henry Ford that held world's records, which will compete in the free-for-all classes and "Whistling Billy," the White steamer which marked a step in the development of automobile speed under the guidance of Webb Jay. This car has been reconstructed and on the board saucer, its trials have demonstrated that it still possesses the same brilliant speed that dazzled race-goers years ago.

Three concrete subways give entrance to the inside of the track and with a 300-foot paddock, grandstands and bleachers, the accommodations for the public are ample.

A point has been raised that the board surface of the track will become oily from the slopped lubrication of the cars and that the curves might be dangerous. The management, however, declares that the construction of the saucer has been so framed that this danger is minimized and that the coating of pulverized shell will take up any amount of oil that is likely to be spilled by the racers. In addition to its use as a motordrome, the track has been equipped with aerodromes and the Aero Club of California will make it its official headquarters.

## DECIDE ON ROUTE OF GLIDDEN TOUR

A meeting of the contest board of the A. A. A. has been called for Wednesday, March 30, to determine upon the course of the Glidden tour of 1910. It had been generally understood that the start of the tour would take place at Cincinnati and that its course would be Southwesterly to Oklahoma City, thence Northeasterly to Chicago, but a distinct impression has been given that this route will be changed materially.

Indianapolis has made a strong bid to supersede the Queen City as the starting point and the indications are that its claims will be urged with power and insistence before the board. One reason underlying the contemplated action by the board is the fact that an effort has been made by a manufacturing concern to forestall some of its rivals by anticipating the selection of the Cincinnati route.

The meeting of the board is of much importance as the details of the tour route will be taken up and a definite decision concerning a number of points, that have not been positively settled so far will be made. Cincinnati's claims will be represented actively, but the indications point to a sharp change in the official itinerary.

## HARRISBURG RELIABILITY RUN

HARRISBURG, Mar. 30—The Fourth Annual Reliability Contest of the Motor Club of Harrisburg will be held on May 9th, 10th and 11th and promises to be one of the largest and best contests of the year in the East. The route will lead from Harrisburg to Reading to Philadelphia to Atlantic City on the first day; Atlantic City to Sea Isle City to Cape May to Wildwood on the second day, and from Wildwood to Philadelphia to Lancaster and back to Harrisburg on the third day.

The rules which governed last year's contest, modified to meet the demands of the A. A. A., will be used. There will be four classes ranking from price classification and handsome trophies will be awarded in each class. A technical examination will follow the contest and the final ranking of the cars will be made from road records and technical examination. In the last three years the Harrisburg club has conducted contests without a protest and the 1910 contest promises to prove the most successful in the history of the club. Prominent automobile men, including David Beecroft, of Chicago, will serve as officials while the contest will have the support of makers and the A. A. A.

# DEATH TAKES PIONEERS FROM AUTOMOBILE BUSINESS

## FATHER OF PIERCE-ARROW IS DEAD

BUFFALO, Mar. 26—George Norman Pierce, father of the Pierce-Arrow car and one of the founders of the Pierce-Arrow Motor Car Company, was buried to-day in Forest Lawn. The funeral was held at the home of his oldest son, Percy P. Pierce, at 168 College street. The services were private.

Mr. Pierce died of heart disease at the Lenox Hotel on Wednesday night. He had apartments in the hotel for the Winter, having been in the habit of dividing the year between the Lenox, Sturgeon Point on the Lake Shore, and San Antonio, Tex.

Mr. Pierce was born in Freiendsville, near Waverley, N. Y., 64 years ago and received his education in the public schools and a business college. He married Miss Louisa H. Day of Boston, by whom he is survived, together with eight children.

He began business in Buffalo as a member of the firm of Heintz, Pierce & Munschauer, making refrigerators and bird cages in 1872. From this, the firm diverged into the making of bicycles and tricycles on Hanover street when the bicycle craze swept the world. The Pierce bicycles obtained wide reputation. The motor car began to occupy Mr. Pierce's attention in 1898, work being carried on in the Hanover street plant until 1907.

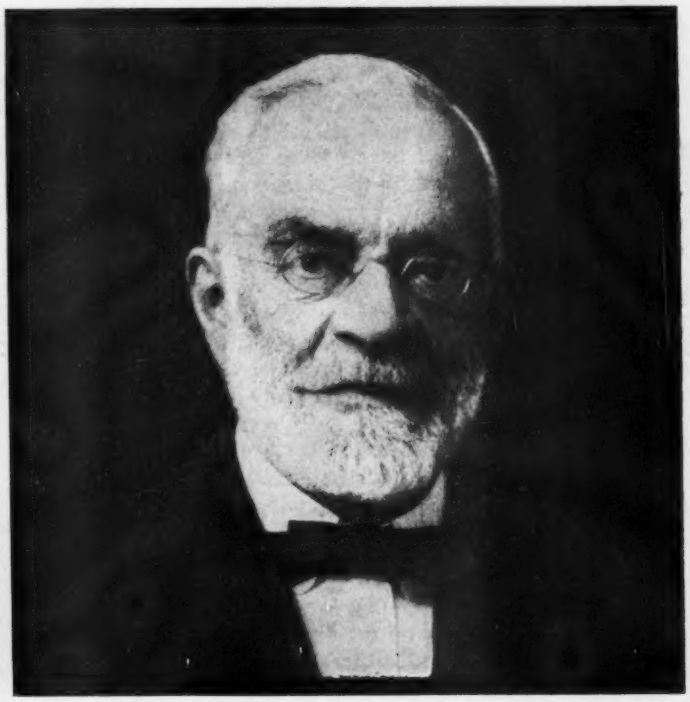
## HEART DISEASE CLAIMS J. A. BRISCOE

Joseph A. Briscoe, one of the pioneers in the manufacturing line at Detroit, died last Friday after an attack of heart disease. Mr. Briscoe was the father of Benjamin Briscoe, president of the United States Motor Company and Frank Briscoe, president of the Brush Runabout Company. He was treasurer of the Briscoe Manufacturing Company of Detroit, although for the past two years he had not been actively engaged in business but devoted himself to horticulture.

He was 72 years of age and his whole life had been full of industry and accomplishment. He was the first engineer to take a locomotive into Detroit and has always been identified with engineering and machinery.

He was born at Philadelphia and removed to Detroit when an infant, spending practically his whole life in the Michigan metropolis. In his youth, Mr. Briscoe invented a machine for making nuts and bolts and was one of the founders of the Michigan Bolt and Nut Works, which is still in existence. He was also connected with a large iron mill at Sharon, Pa., and in the later years of his life engaged in the insurance business, being at one time agent of a life and accident insurance company.

George Norman Pierce, Founder of Pierce-Arrow Motor Company, formerly the George N. Pierce Co., who is dead at Buffalo, N. Y.



Joseph A. Briscoe, father of Benjamin and Frank Briscoe, and himself treasurer of the Briscoe Mfg. Co., who is dead at Detroit

# FIRST ANNUAL BANQUET OF A.L.A.M. APRIL 7

Amid sumptuous surroundings, the first annual dinner of the A. L. A. M. will be held April 7 at the Hotel Astor. The function will be most elaborate and it is expected that a gathering, thoroughly representative of the manufacturing industry will assemble.

Governor Fred N. Warner of Michigan will be one of the speakers, his acceptance of the invitation tendered him having been received Tuesday. William H. Edwards, head of the street cleaning department of New York will also make an address as will Arthur Brisbane and Col. Charles Clifton, president of the association.

Job Hedges, noted for the quality of his after-dinner speeches will act as toastmaster.

The list of speakers represents a wide field and as considerable latitude is allowed in the choice of subjects, the oratorical program is attracting much attention among the members of the association.

It is expected that 200 will be present, the attendance being limited to three representatives from each of the concerns identified with the association.

Acceptances have been coming in at a satisfactory rate and a special effort is being made to make the occasion notable.

# LATEST DOINGS OF THE A. A. A. CONTEST BOARD

THE Contest Board of the A. A. A. held an important session March 29, at which a number of matters of interest came up for action.

It was decided to sanction a race meet on the Indianapolis Motor Speedway, May 30, under the title of the National Stock Car Championship Automobile Race Meet.

This event follows the Grand Circuit meeting at Indianapolis, May 27-28, and will be the first time that stock cars will contest under the new rules of the A. A. A. All classes of stock cars are eligible to entry in one or more of the races, which will number fifteen.

Gold medals will be awarded the winners in each race; silver medals to the seconds, and bronze medals to the cars that finish third.

Owing to the fact that the races will have a national character, special care has been observed by the board in preparing the details of the rules.

It was definitely decided that the Glidden Tour of 1910 will start from Cincinnati in the middle part of June. The rules and entry blanks for the tour have been finally approved.

In view of the friction that has sometimes followed various events held under the jurisdiction of the board, owing to varying constructions placed by local officials upon the rules, the board decided to issue printed instructions to its representatives all over the country, so that rulings might be more uniform.

The board certified the record of Oldfield at Daytona, in which he broke the beach record for the mile, flying and standing starts; the kilometer flying start, and the two-mile flying start.

The appeal of the Columbia car, which finished second to the Pennsylvania entry in the tour from Los Angeles to Phœnix, which was concluded with a race at Phœnix, was sustained, and the purse of $500 was awarded the Columbia. The question was raised when the wheels of the Pennsylvania car were changed after completing the tour, but before the car took part in the race.

## LOUISVILLE SHOW PROVED A SUCCESS

The third annual exhibition of the Louisville Automobile Dealers' Association, which closed Saturday night after holding attention for three days, will go down in the city's history as the greatest event of the kind ever held in this locality and was a fitting introduction to what seems to be destined to be the biggest and best motor year for all concerned. Although the exact figures cannot be had because of the tendency of some dealers to keep their sales secret, officers of the association say that fully 100 cars were sold at the show, representing $200,000. This means that about half of the exhibit changed hands and will soon be speeding up and down the streets of Louisville and the highways of Kentucky.

The dealers anticipate a big month in sales. They say that the show has stirred interest in motor circles ,and that many who could not definitely decide upon a purchase while the show was in progress will do so this month. Many of the dealers have already applied for space in the 1911 show, which will be on a much larger scale than even the exhibition this year.

## TRADE ASS'N WILL FIGHT FREIGHT INCREASE

CHICAGO, Mar. 29—Instead of celebrating the opening of the driving season by a week's carnival, the Chicago Automobile Trade Association at its meeting last night decided to substitute a floral parade to be held on the night of May 7. The carnival feature has been postponed until Fall when the dealers will have more time to handle it. The meeting also discussed the threatened 25 per cent increase in freight rates which the A. L. A. M. now is fighting and a resolution pledging the support of the local association was passed and will be forwarded to the traffic department of the A. L. A. M. Fourteen new members were admitted and the association now comprises about 60 of the most prominent concerns in the city. J. B. Maus, manager of the Pennsylvania Tire branch, qualified as secretary, to fill the vacancy caused by the resignation of F. E. Sparks.

## PIERCE-ARROW 1911 DELIVERIES

The Pierce-Arrow Motor Car Company, of Buffalo, N. Y., will have its 1911 models, particularly the 6-cylinder 66, so far advanced by the middle of July that a limited number of deliveries to customers who may care to tour abroad are being promised. It is the Pierce-Arrow idea that it is an advantage to thus start delivering in the middle of the touring season, since it affords opportunity to tour abroad in season.

## TEN MILES OF LONG ISLAND PARKWAY

By September, ten more miles will be added to the Long Island motor parkway, the clearing, grading and blasting necessary upon the course having been practically completed from Bethpage Lodge to Lake Ronkonkoma. The stretch from Meadow Brook Lodge to Great Neck, which was prepared in 1909 is being given a surface of bituminous macadam and the new work will be treated similarly this summer.

In constructing this section, ten highways are crossed either above or below grade, while steel and concrete viaducts traverse branches of the Long Island Railroad and the trolley line running from Hicksville to Mineola. Two toll lodges have been built, one at Great Neck and the other near Mineola.

The plan that is being worked out in the construction and improvement of this parkway is very similar to the original idea.

## PLANS NATIONAL AUTOMOBILE SHOW

Stewart McDonald, general manager of the Moon Motor Car Company, has started a movement in St. Louis to hold a national automobile show in that city for two weeks in the latter part of September, during the National Good Roads convention. The Million Population Club of St. Louis has taken up the plan, which provides for holding the show in tents under the auspices of either the National Association of Automobile Manufacturers or the Association of Licensed Automobile Manufacturers.

## HARTFORD DEALERS HOLD ANNUAL MEETING

At the annual meeting of the Hartford Automobile Dealers' Association held Wednesday evening of this week the following officers were re-elected: President, Ralph D. Britton; vice-president, L. H. Elmer; secretary, S. A. Miner; treasurer, Fred W. Dart. Following the election, plans for the show to be held in 1911 were discussed. The present show committee: Fred W. Dart, E. G. Biddle and W. L. Ledger were instructed to look into the matter and to report at the next meeting.

## COL. CHARLES CLIFTON HAS RETURNED

Substantially a month ago, Col. Charles Clifton, president of the A. L. A. M., and the Pierce-Arrow Motor Car Company, and Mrs. Clifton, departed for the Carribean Sea and adjacent interesting points, for a rest and recreation, and after an interesting voyage, leaving dull care behind, returned much invigorated, and the pressure which Col. Clifton is accustomed to applying to affairs automobile will be felt again.

# UNITED STATES MOTOR COMPANY ABSORBS WINTON

WITH rumors flying thick and fast as to combinations, mergers and the like, the denials flying fully as fast, the layman is at a loss just what to believe. In the latest report to the effect that the United States Motor Company has acquired the Winton Motor Carriage Company, of Cleveland, there is more of truth than in other stories going the rounds lately; in fact, coming as it does directly from the inside of the acquired concern, it may be taken as a settled fact. With this acquisition, the United States Company holds an enviable position in the industry, due to the prestige which was added to the combination by the subsidizing of Alexander Winton, a pioneer in the automobile industry, and the possessor of an immense and well-equipped plant at Cleveland, to say nothing of a vast and well organized selling organization, with factory branches in New York, Chicago, Boston, Philadelphia, Baltimore, Pittsburgh, Cleveland, Detroit, Minneapolis, San Francisco and Seattle.

Rumors of further mergers of automobile companies have been plentiful during the past week, but so far as could be determined, their foundation is not sound. It was reported rather persistently that the Studebakers had gained control of the Ford Automobile Company of Detroit, but the rumor was definitely nailed by a statement to the contrary by F. S. Fish, director of the Studebaker company and by a general denial of further activities in the merger line, by W. R. Ennis of New York. The home office of the Ford Company also denied the story and branded it as "made of whole cloth." Mr. Ennis said that so far as he knew, there were no more mergers contemplated by the Studebaker interests and their allies in Indiana.

In the meantime Ford is holding the fort and it is said that he is entertaining offers from competent sources, one of which is mentioned as the United States Motor Company, but this rumor cannot be confirmed.

## NEW FACTORY FOR BOSCH MAGNETO

Plans for the largest magneto factory in America are being prepared for the new Bosch Magneto Company's plant, which will be erected at Springfield, Mass., this Spring. Several of the preliminary contracts have been let and the work is being rushed along as fast as possible. The factory site at Springfield consists of seven acres and was purchased by the company during the past month.

The buildings will be of reinforced concrete and will be constructed upon lines of most modern development and design. Particular attention has been directed toward sanitary improvements.

## ALL-CONNECTICUT RELIABILITY RUN

HARTFORD, CONN., Mar. 28—Progress has been made by the contest committee of the Automobile Club of Hartford for the forthcoming three-day, all Connecticut reliability run, which is to be conducted under the rules of the A. A. A. Entry blanks to the number of 3,000 will soon be issued and will be circulated about the country generally, it being the intention of the committee to see that each manufacturer receives two blanks.

Entries close Wednesday, May 18, and all cars must report to the technical committee the day before the start of the first day's run, at the club garage.

## HAMMOND NOT GUILTY OF LARCENY

Chauncey W. Hammond, charged with stealing $17,000 from the E-M-F Company by switching satchels in the First National Bank of Detroit, Nov. 19, 1909, was acquitted of the charge by a jury in Judge Phelan's court.

The jury deliberated for two hours and took four ballots before the members all agreed upon their verdict.

Hammond is still held on charges of padding payrolls, but the bail on this count is comparatively trifling as compared with that required on the major indictment. Hammond was formerly paymaster of the E-M-F Company but at the time of the loss of the money he was not in its employ.

## MUCH BUSINESS IN SIGHT ON COAST

W. A. Paterson, president and general manager of the W. A. Paterson Co., Flint, Mich., is touring California in a Paterson "30." Mr. Paterson is optimistic over the winter's business on the coast, finding the "30" well established in popular favor by reason of its sturdy qualities. Strong evidence of its strength was given last week when the Paterson won out in the annual hill climbing contest at Oakland., one of the most trying tests of the season.

## E-M-F DIRECTORS ON STUDEBAKER BOARD

SOUTH BEND, IND., Mar. 25—As the result of the merging of the interests of the Studebaker Brothers Manufacturing Company and E-M-F Company, a meeting of the board of directors of the Studebaker Brothers Manufacturing Company was held at the offices of that company in South Bend on Wednesday and at the invitation of the management, Walter E. Flanders, president and general manager of the E-M-F Company, and Frederick W. Stevens, of J. P. Morgan Company, of New York, accepted the nomination and were elected members of the board of directors of the Studebaker Brothers Manufacturing Company. Both are members of the board of directors of the E-M-F Company.

## FIRE DESTROYS TWENTY-FIVE CARS

CAMDEN, N. J., Mar. 28—When the assessor comes around he will have twenty-five fewer automobiles to record as being owned here. A fierce fire in the garage of J. G. Reeves, 106 North Seventh street, last Wednesday morning reduced that many cars to rusty scrap in something less than an hour. Despite the fact that the cars were all stored on the ground floor, the blaze was so intense and the gasoline explositions so terrifying that but one car could be removed, and that was used by an employee to summon the engines. It is estimated that the loss was $75,000.

## SWANN BILL PASSES SENATE

BALTIMORE, Mar. 27—Decorated with a number of amendments, the Swann motor vehicle bill has been passed by the State Senate and will now be thrashed over in the House. The chief change in the measure as it stands is a provision to allow the city of Baltimore one-fifth of the revenue from licenses, after the running expenses of the Automobile Commissioner have been paid. This revenue is to be applied to street improvements.

## MOTORISTS FAVOR NATIONAL LAW

CHICAGO, Mar. 28—Pressure is being brought to bear upon Congressman James R. Mann, of the First District of Illinois, by the Chicago Motor Club and other automobile interests to influence a favorable report on the Federal Registration Automobile bill, now pending before the Interstate and Foreign Commerce Committee.

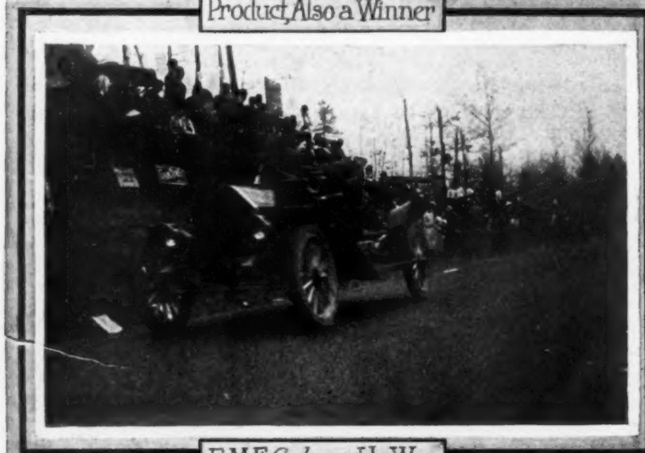
## PARKER GEAR WILL BE MANUFACTURED

It is learned that the Parker transmission which was illustrated in THE AUTOMOBILE recently, will be manufactured by the Parker Transmission & Appliance Company, now located at Springfield, Mass.

Krit Car Won First Place in Event One


After the Races, Crowd Starting Home

White Star, a Home Product, Also a Winner



E-M-F, *Cohen* Up, Won But Was Disqualified

Oldknow in a Buick Winner of Event Four

ATLANTA, GA., Mar. 26—Although there were fewer entries and fewer starters in the Atlanta hill climb this year than last, and though the crowd was smaller and the marks slower, it was none the less a creditable affair and the time for the .88 mile made by A. R. Almand, driving Ed Inman's Simplex car, 47 4-5, was the fastest ever shown by a gasoline car on the hill. The mark of 45 4-5 made last year by a White Steamer still stands and is likely to for some years to come.

The names of Strang and Burman, which conjured crowds of large proportions to the Stewart Avenue hill last Spring, were missing from the lists of drivers. Only local men took part in any of the events, although several of the factories had mechanics on hand to see that the cars were in good trim.

As has ever been the case with events held in Georgia, the course was policed in a most excellent manner, the crowds stayed where they belonged and there was nothing which bore the faintest possible resemblance to an accident.

The climb was set for 1:30 and everything was in readiness then but the timing apparatus, a home-made contrivance that worked well last year and that showed real class in the preliminary warm-ups this year. At the critical moment it quit utterly and after an hour of tinkering it was given up as a bad job and the cars were timed by stop watches at the top and with the aid of a telephone which, fortunately, remained in working order.

The wrestling match with the timing apparatus consumed an hour and at 2:30 the first of the little cars got away in the baby class and thereafter they were run up rather steadily; but it was well on toward dark before the Simplex came whirling up, the last car to climb and the winner in the free-for-all.

The Krit and the Hupmobile had things their own way in the class for cars costing $800 or under, owing to the fact that the Flanders arrived too late to take part. Of these the Krit had made the better time in practice, showing 1:18 and though it could not approach this mark in the climb it made 1:25 which was good enough to win. The first time the Krit came up there was bad team play on the part of the timers and it had to make a second run, which it did successfully.

Class 2 had a goodly number of entries and starters but it was hardly a close contest, for the Buick showed 1:07 right at the start and spoiled the fun. Nearest to it came the Warren-Detroit which made a mark of 1:15 1-5. A Ford was third.

Class 3 was the only one enlivened by a protest. In this event the E-M-F burned out its wiring a few minutes before it was time to start. Another E-M-F was accordingly borrowed and made the lowest time in the class, 1:15. It was disqualified, however, for being shy a few stock parts, including a lamp and a dust pan. This disqualification gave first place to a White Star, an Atlanta-made car, which consumed 3-5 second more. A Buick was second and a Parry third.

In class 4 four of the six starters were Buicks and three of the four were "placed." William Oldknow's car, which came through the New York to Atlanta run with a perfect score, was first in this event with a mark of :57 2-5. This was the best time

Some of the Interested Spectators


With the Officials at the Starting Line

of the day in any class except the free-for-all and was better by 3-5 seconds than Strang's remarkable time of last season.

In the free-for-all there was never much doubt but that Ed Inman's Simplex would prove the winner, for it outclassed the rest of the field in power; and won in handy style. A. R. Almand, winner of the free-for-all two years ago, was at the helm.

A 40-horsepower Knox, the identical one that cost a life last year at Indianapolis, was a neat second, making the climb in 50 1-5 seconds, with John F. Toole, winner of the first local free-for-all, at the wheel. A National was third and a Pope-Hartford fourth. The summary follows:

The summary follows:

**CLASS 1—Cars Costing $800 and Under.**

| Pos.—Car | Entrant | Driver | Time |
|---|---|---|---|
| 1 Krit | Kelly-Knight Co. | C. F. Woolfe | 1:25 |
| 2 Hupmobile | E. D. Crane & Co. | K. T. McKinstry | 1:31 |
| 3 Metz | Dixie Auto Co. | D. R. Miller | 3:43 |

**CLASS 2—Cars Costing $801 to $1,200**

| | | | |
|---|---|---|---|
| 1 Buick "10" | Buick Motor Co. | L. E. Fain | 1:07 |
| 2 Warren-Detroit | Carmichael Co. | J. E. Darby | 1:15 1-5 |
| 3 Ford "T" | Carolina Cement Co. | M. W. Venable | 1:19 |
| 4 Mitchell "R" | Howard Co. | R. C. Howard | 1:26 3-5 |
| 5 Cameron "16" | Dixie Auto Co. | G. F. Hardy | 1:31 |
| 6 Cameron "15" | Dixie Auto Co. | J. B. Wall | 2:16 |

**CLASS 3—Cars Costing $1,201 to $1,600**

| | | | |
|---|---|---|---|
| 1 White Star | Atlanta Car Co. | C. E. Jones | 1:15 3-5 |
| 2 Buick "19" | Buick Motor Co. | P. O. Parmalee | 1:18 2-5 |
| 3 Parry "35" | Capers Car Co. | P. C. Shultz | 1:28 3-5 |
| E-M-F "30" | Georgia Car Co. | H. L. Cohen | disqualified |

**CLASS 4—Cars Costing $1,601 to $2,000**

| | | | |
|---|---|---|---|
| 1 Buick "16" | Wm. Oldknow | Wm. Oldknow | :57 2-5 |
| 2 Buick "17" | Buick Motor Co. | P. O. Parmalee | 1:02 |
| 3 Buick "16" | Buick Motor Co. | L. E. Fain | 1:03 2-5 |
| 4 Pullman "O" | Pullman Co. | R. T. Peckham | 1:13 |
| 5 Buick "17" | W. E. Wimpy | T. B. Dial | 1:15 |
| 6 Inter-State | Inter-State Co. | A. R. Brown | 1:15 3-5 |

**CLASS 5—Cars Costing $2,001 to $3,000**

| | | | |
|---|---|---|---|
| 1 National | W. J. Stoddard. | W. J. Stoddard | :58 |
| 2 Knox "M" | J. F. Gatins, Jr. | L. W. LaBlanche | 1:07 1-5 |
| 3 Marmon | W. T. Candler | W. T. Candler | 1:09 2-5 |
| 4 Pope-Hartford | A. W. Kirk | A. W. Kirk | 1:13 |
| 5 Selden | R. F. Ingram | Roy G. Young | 1:20 2-5 |

**CLASS 6 and CLASS 7—Cars Costing $3,001 and Over**

| | | | |
|---|---|---|---|
| 1 Packard | J. D. Rhodes | C. C. Rooney | 1:04 4-5 |
| 2 Stearns | W. T. Dunn | W. T. Dunn | 1:05 3-5 |

**FREE-FOR-ALL**

| | | | |
|---|---|---|---|
| 1 Simplex | E. H. Inman | A. R. Almand | :47 4-5 |
| 2 Knox | Georgia Knox Co. | John F. Toole | :50 1-5 |
| 3 National | W. J. Stoddard | W. J. Stoddard | :55 1-5 |
| 4 Pope-Hartford | Steinhauer & Wight | A. R. Almand | 1:03 1-5 |

## SAVANNAH ENDURANCE RUN POSTPONED

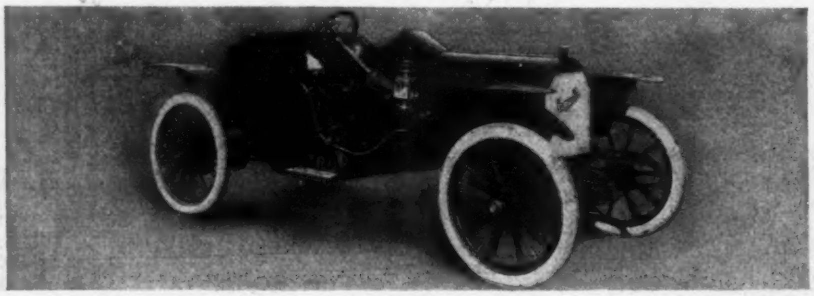
SAVANNAH, GA., Mar. 28—The endurance run of the Savannah Automobile Club, which was scheduled to take place on March 28 and 29 has been postponed to April 5 and 6. This run, which will be from this city to Jacksonville, Fla., is already attracting attention in all parts of the country. The run to Jacksonville will take two days and will, when complete, form the last link in the great highway route between New York and Florida.


National Which Won First in Class Five

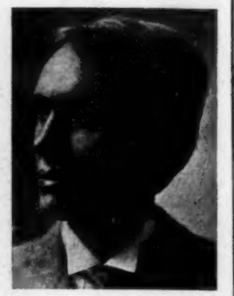

Roades, in Packard 30, Made Very Fast Time


Simplex, Almand Cleaned Up in the Free For All

# AMONG THE GARAGES



Correja 35-horsepower runabout, which makes its initial appearance in New York City under the management of J. Mora Boyle, at 1851 Broadway. It is made in Elizabeth, N. J.



George M. Schebler, of Wheeler & Schebler, Indianapolis

Baack, Reed & Gage Company, a new garage and agency concern at Janesville, Wis., has absorbed the Roy Pierson garage. The Pierson garage on South Main street, Janesville, will be abolished and all business will be done from the large new building owned by the Baack, Reed & Gage Co. on North Main street. The building has dimensions of 45 by 125 feet, three stories high, strictly fireproof and is one of the best of its kind in southern Wisconsin. Roy Pierson is retained as sales manager.

Thomas J. Northway, 92-94 Exchange street, Rochester, N. Y., where he is selling Fords and Oldsmobiles, is building a three-story structure at 100-2-4 Exchange street which he hopes to occupy this summer. The new building is 54 by 140 feet with three stories and basement. It will be of fireproof brick construction with a big show room in the front half of the main floor. The back half will be a garage. The second floor will be a paint and repair shop, and the third, a machine shop.

The Waynesboro Garage Company, of Waynesboro, Pa., has voted to increase its capital stock from $10,000 to $20,000 and to apply for a Pennsylvania charter. The money will be used to equip the old market house as an up-to-date garage. Dr. D. B. Sniveley, Dr. P. D. Hoover, Dr. C. W. Baerd, D. L. Miller and W. H. Smith constitute the building committee. The Garage Company now has a membership of over fifty.

The Central Automobile Company has leased the garage at 6112 Broad street, East End, Pittsburg, and will use it for a distributing station. P. W. Newell is president and A. E. Corns is secretary and treasurer of a new company which has established a central garage on South Gallitzin avenue, Uniontown, Pa. They will handle the Elmore car.

The Reimers Motor Car Company, of Louisville, Ky., has assumed the agency of the Babcock Electric Company. A garage, which will cost $15,000, and which is to be equipped with facilities to handle electrics as well as gasoline cars, is being built for the company, and the expectation is that it will be completed in April.

The Roe-Halverson Auto Co., of Stoughton, Wis., has leased part of the Peterson blacksmith shop on Main and Fifth streets, Stoughton, and this is now being converted into a garage. In addition to this, the company has a large warehouse two blocks away. The new quarters will be used for offices and repair shop.

Judge Dodge, of the Elkhart, Indiana, County Circuit Court, has appointed Milo W. Stark receiver for the Elkhart Garage Company. The complaint declares the company owes $7,000, and has $3,000 in assets. The receiver was granted permission to continue business for thirty days.

Extensive additions are being made to the sales rooms and garage of the Central Ohio Motor Car Company, 61 East Spring street, Columbus. The office has been moved to the second floor, giving more space for showing automobiles. The repair shop is also being enlarged.

At Clarkville, Ohio, the Kilpatrick French Automobile Company has purchased a lot at Broadway and South street, where a $12,000 garage and salesroom will be erected. The building will be two stories high and will have a large repair department in the basement.

The Taylor-Prior Company of Eau Claire, Wis., representing the Stevens-Duryea, has commenced work on its new garage on South Barstow street. It will be of cement block construction, strictly fireproof and will include a repair department.

Instead of remodeling the former Cary livery stable for the agency of C. J. Edwards at Appleton, Wis., the Cary estate has started work on a large new building especially for garage purposes. It will be completed about May 1.

The Homestead Automobile Company has completed its garage at 209 Seventh avenue, Homestead, Pa., and will handle the Franklin and Rambler cars. M. W. Coulter is president and manager.

The Hopkins Motor Car Company, of Clinton, Ia., will open a garage in the Shoecraft Building, at First street and Fifth avenue, that city. The company handles the Jackson and Fuller.

The City Motor Car Company, recently organized in Houston, Tex., has let the contract for the erection of a two-story brick garage at Caroline street and Texas avenue, to cost $15,000.

Cliff Garrison and Peter Young have opened an auto livery at Kent, Ohio, with several cars in service.

## Men Prominent in the Trade

Fred Haumerson, of Fort Atkinson, Wis., for several years associated with the Mitchell-Lewis Motor Company, of Racine, Wis., has been appointed field expert of that company.

Frank L. Black, recently connected with the Diamond Rubber Company as salesman in Boston and vicinity, has joined the sales force of the Boston branch of Morgan & Wright.

E. L. Moore, for seven years in the advertising department of the Cleveland *Plain Dealer,* has succeeded W. S. Gilbert as automobile editor of that publication.

Webb Jay has joined the forces of the United States Motor Company and will act as assistant district manager at Chicago.

Carl Van Seiver, Cleveland agent for the Randolph truck, has moved to new quarters in automobile row at 1526 Euclid avenue.

J. S. Bretz, of J. S. Bretz Company, importers, is in Europe on a tour in which pleasure is combined with business.

# WITH THE AGENCIES

Marmon "Yellow Jacket," built to compete at Los Angeles and other meets during the coming season. It has a six-cylinder motor. Ray Harroun, the successful Marmon driver, is the pilot

Alvan Macauley, general manager of the Packard Company, Detroit

The Keller Manufacturing Company, of Philadelphia, has purchased the business of the W. P. Pressinger Company, of New York, its general eastern distributor and distributor for Michigan, and this territory will hereafter be handled direct by the Keller Manufacturing Company. J. J. Swan, secretary of the W. P. Pressinger Company, will be associated with the Keller Manufacturing Company.

The Firestone Tire & Rubber Company has opened a branch at 442 Van Ness avenue, San Francisco. The company has also established two more general distributing agencies. One is the Fort Wayne Vulcanizing Works, 215 West Main street, Ft. Wayne, Ind., and the other is the Burwell-Smith Auto Supply Company, 416 North Broadway, Oklahoma City, Okla.

The Curtis Automobile Company, Milwaukee, Wis., State representatives of the Reo, which recently took on the Corbin, has been appointed representative of the Hupmobile. A new garage is being built for the Curtis concern on Eighth street, near Grand avenue, opposite the large garage of the McDuffie Automobile Company.

The Euclid Automobile Company, of Cleveland, has been appointed distributor of the 60-horsepower Atlas. The company is already agent for the Firestone-Columbus, Columbus electric and Frayer-Miller truck. Recently the company occupied a large new garage and sales building in the heart of automobile row.

The Toledo Regal Sales Company, of Toledo, Ohio, was incorporated recently, with capital stock of $5,000, to act as agent for the Regal in Northwestern Ohio. The incorporators were William S. MacMurray, H. J. Chittenden, A. L. Trautmeier, William Rather and Charles Rather.

The Anderson Motor Car Company, of Fond du Lac, Wis., is district agent for the Mitchell and Maxwell in a large territory of central Wisconsin. M. M. Anderson is manager. The garage and salesrooms are located at 34-38 West Second street, Fond du Lac.

The Vestal Motor Car Company has secured the Pittsburg agency for the Auto Car, manufactured by the Auto Gas Engine Works, of Philadelphia, Pa., and will exhibit it shortly in the Rittenhouse Building in the East End.

W. A. Eckles has taken the Cleveland agency for the Anhut Six and has opened temporary headquarters in the Citizens Building. A large sales and garage building will be occupied later in the downtown district.

The Tanberg Auto Company, of Eau Claire, Wis., has opened a branch in Chippewa Falls, Wis., at 203 Bridge street. The company represents the Peerless, Winton, Oldsmobile, Buick, Oakland and Waverly electric.

The Asheville (N. C.) Cycle & Automobile Company has shortened its title by eliminating the "Cycle." In future it will be known as the Asheville Automobile Company. There has been no change in ownership.

The Forbes Motor Car Company has secured the Pittsburg agency for the Krit runabout and roadster and also the Abbott-Detroit 30-horsepower, five-passenger car. H. N. Munhall is manager.

The L. J. Gilmer Company of Salt Lake City, Utah, agent for the Empire Tire Company, will hereafter be known as the Utah Motor Car Company. The change went into effect March 10.

Geo. E. Loveland has been appointed Pennsylvania representative for the Kilgore shock absorbers, a Boston-made product, with headquarters at 107 Reily street, Harrisburg.

At Toledo the Atwood Automobile Company has leased the building formerly used by the Dollar Savings Bank, and it is being fitted up as a downtown show room.

The Everitt "30" has opened quarters in Pittsburg, with Edward Bald as manager, and the concern will be known as the Eddy Bald Motor Car Company.

Chas. Strader has been placed in charge of Western agencies of the Keller Manufacturing Company, with offices at Chicago and Lincoln, Nebraska.

J. C. Donahue has secured the Pittsburg agency for the Whiting and is opening a new garage on South Beatty street, East End.

The Tedford Auto Company, of Little Rock, Ark., has been appointed State agent in Arkansas for the Moon Motor Car Company.

The Muhle-Louis Automobile Company, of Cincinnati, was incorporated with a capital stock of $7,500 by H. M. Muhle and others.

The Ideal Electric Company has secured the Chicago agency for the Federal Motor Car Company, of New York, a new concern.

## New Packard Company Executive

Alvan Macauley has resigned as general manager of the Burroughs Adding Machine Company to become general manager of the Packard Motor Car Company, of Detroit, succeeding S. D. Waldon, who has been elected vice-president of the Packard Company.

Mr. Macauley has been general manager of the adding machine company for eight and one-half years, and was one of the men responsible for bringing the Burroughs plant to Detroit.

He first obtained prominence in the commercial world as a patent attorney, practising in Washington, but gave up that practice to become associated with the National Cash Register Company, at Dayton, Ohio, which position he occupied for years.

# INDEX TO ADVERTISERS